R842-05 ERIC REPORT RESUME

ED 010 250 2-27-67 24 (REV)
CRITICAL REACTIONS, SELF-CONCEPT, AND BEHAVIORAL PREFERENCES, FINAL REPORT.
VIDEBECK, RICHARD * MAEHR, MARTIN L.
UWL70518 SYRACUSE UNIV., N.Y.
CRP-S-628-25
BR-5-8399
-AUG-66 OEC-1-6-058399-0665
EDRS PRICE MF-$0.27 HC-$5.28 132P.

*INDIVIDUAL DIFFERENCES, *SELF CONCEPT, *INDIVIDUAL DEVELOPMENT, *BEHAVIOR THEORIES, *BEHAVIORAL SCIENCES, MOTIVATION, SYRACUSE, NEW YORK

THE SIX PAPERS COLLECTED IN THIS REPORT DEAL WITH THEORETICAL AND EMPIRICAL EFFORTS IN RESEARCH ON THE DEVELOPMENT OF THE SELF-CONCEPT. THE THREE THEORETICAL PAPERS EXTEND THE THEORETICAL FRAMEWORK DEVELOPED BY THE PRINCIPAL INVESTIGATORS IN THEIR EARLIER WORK AND ALSO CALL ATTENTION TO AND ELABORATE UPON FUNDAMENTAL SOCIAL AND PSYCHOLOGICAL ISSUES RELEVANT TO BEHAVIORAL SCIENCE THEORY AND PRACTICE. THE EMPIRICAL STUDIES CENTER ON THE BEHAVIORAL EFFECTS OF VARIATIONS IN SELF-CONCEPTS AND RELATED VARIABLES. THE CONCLUSIONS CONTRIBUTE TO THE UNDERSTANDING OF INDIVIDUAL DIFFERENCES IN THE PROCESSING OF COMMUNICATED INFORMATION AND THE BEHAVIORAL EFFECTS OF THESE DIFFERENCES. (GD)

ED010250

FINAL REPORT
Project No. 5-8399 (5-628-25)
Contract No. OEC 1-6-058399-0665

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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August 1966

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

CRITICAL REACTIONS, SELF CONCEPT AND BEHAVIORAL PREFERENCES, FINAL REPORT

Project No. 5-8399
Contract No. OEC 1-6-058399-0665

Richard Videbeck
and
Martin L. Maehr

August, 1966

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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ACKNOWLEDGEMENTS

Many individuals contributed to the project. The principal investigators wish to express special appreciation to the following persons whose cooperation and assistance made the entire study an enjoyable and productive enterprise: Dr. Dan Hays, research associate; Roy Malpass, research assistant; Mrs. Jeanne Pilger, secretary; John Scott, research assistant; Mrs. Doreen Wallace, secretary; and Roland Werner, data analyst.

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PROLOGUE

The six papers collected in this volume, report the major theoretical and empirical efforts of the principal investigators and their staff, conducted under an Office of Education Contract, OEC 1-6-058399-0655, for the period April 1 to August 31, 1966. The very short duration of the contract precluded the execution of a number of promising and interesting experimental designs, which the completed work suggested. However, a few exploratory excursions were made into intriguing issues.

The work reported here is a continuation of the principal investigators research on the development of the self concept. In previous studies, the investigators demonstrated several systematic, reliable, and replicated relations between experimentally manipulated evaluations of _S_'s performance, on the one hand, and their ratings of their competence to engage in selected activities, on the other hand. Specifically, it was found that approving evaluations of _S_'s activity by a "judge" reliably increases and disapproving evaluations reliably decreases _S_'s ratings of their competence to perform that activity. It was also found that effects of such critical evaluations tend to spread to _S_'s self-rated competence of "semantically similar" activities. Finally, it was observed that these effects are durable over time.

In recent years the concept of self has evolved as an important variable in psychological research. Following the early formulations of Cooley, Mead, and Sullivan, researchers have been, first of all, concerned with delineating the effects of _socially mediated feedback_ on _S_'s view of self. In Mead's terms, an attempt has been made to determine

how "significant others" can and do affect change in a person's self concept. But neither theory nor research has confined itself to a simple analysis of development and change in the experience of self. Typically and characteristically, interest in the concept of self has prompted questioning regarding how this cognition affects other aspects of behavior. In other words, theory and research have also viewed self as an important independent variable which when manipulated can and does effect measurable changes in other systems of behavior.

In Chapter I of this report, Dr. Maehr reviews the recent literature on theory and research into the self concept. One of the striking observations made in this review, is that little theory and research have dealt with the above questions either exhaustively or analytically. As a result, many important questions have not been answered or in some not even cases clearly formulated.

Our previous work has been guided by the general notion that a person's self concept is basically reflected in the person's ratings of his behavioral competence. Building upon this notion and borrowing from White's formulation, in Chapter II, Dr. Maehr provides a theoretical analysis which argues strongly for the centrality of "self-rated competence" in a theory of self. Dr. Maehr provides the connective tissue between the self and motivational concerns, and between self and choice behavior. A test of some of the implications of the theoretical framework developed in this paper, is reported in Chapter V.

Within our theoretical perspective socially mediated feedback is a major variable in the development and maintenance of self concepts. In the main, one's self concept is a product of the critical or evaluative reactions of other persons. While evaluation may be effectively communicated by gestural and behavioral means, the most articulate and most pervasive medium for transmitting information, including evaluation, is natural languages.

Natural languages are the most formalized and conventional modes of human communication. In spite of the high degree of syntactic and semantic conventionality, there are considerable individual differences in the use of natural language. In Chapter III, Dr. Daniel Hays develops the arguments that individual differences in linguistic usage are predictive of individual differences in cognitive functioning. He reports empirical studies which treat the relation between syntactic variables on the one hand, and concept acquisition and the semantic similarity among concepts on the other.

The last three chapters of this volume report empirical studies. In the first study, described in Chapter IV, two issues are explored. First, the relationship between a person's self-rated competence in a task and his tendency to choose that task when given the opportunity, is tested. Secondly, the experiment explored how self rated competence at a task varies with respect to selected level of success-failure experiences. The second experiment, reported in Chapter V, examines the relation between risk-taking and persistence in task performance. The third study is presented in Chapter VI. This investigation deals with the relation between the syntactical structure of a message and the accuracy with which the information in the message is processed.

The implication of the work reported in this volume for education practice and research is amplified in the Epilogue following Chapter VI.

CHAPTER I

THE SELF IN RECENT THEORY AND RESEARCH

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In the early forties Gordon Allport (1943) asked, in essence, whatever happened to the self in psychology? Although appropriate at the time, the question seems peculiarly dated today. Not only has the term "self" become a part of acceptable psychological jargon and found its niche once again in the lore of psychology, it has a prestigious position in many psychological theories and presumably is an acceptable object for research and inquiry. As a matter of fact, already in the 1950's Gordon Allport (1960) could reflect with amazement or perhaps amusement, that terms such as self, self-concept, self-percept, phenomenal self, and ego had returned to almost every nook and cranny of psychological theory. The behavioristic revolution which had presumably disposed of the construct was apparently subjected to a counter-revolution. Or, as Hebb (1960) suggests, the behavioristic revolution provided the necessary base for valid reconsideration of the construct. In any case, 'talk about self' is not forbidden today. Few texts on personality can ignore something called the 'self concept' and even a casual survey of recent journal articles will indicate that researchers still have some interest in the phenomena that labels such as self, self concept, phenomenal self, and ego seem to connote.

The question is, where has all this talk about self gotten us? In answer to this question one is tempted to answer simply: a lot of confusion. There is no one predominant theory of self nor are there generally agreed upon definitions, as Lowe's (1961) review emphasizes. Be that as it may, all of this talk about self has had some continuity and coherence. For the most part, the research and theoretical effort have focused on two major aspects or characteristics of human behavior. (1) People do report or otherwise suggest that they have a knowledge of and experience with something called me. Call it a percept, a concept, an attitude or a combination of the three people do at least talk as if a self exists. Self research has been first of all directed to explicating the nature of this experience. (2) But typically, and quite understandably, researchers and theorists have not been content to deal with self-experience as an isolated and perhaps curious phenomenon. Rather they have attempted to relate this real or presumed experience to a variety of other covert or overt activities. Some (e.g., Rogers, 1951, 1959; Combs and Snygg, 1959) have made the self a prime motivational construct. Others (e.g., Allport, 1955; Sarbin, 1954) have at least suggested that it plays an important role in directing and patterning behavior. As a matter of fact, almost anyone who has taken self-experience seriously has also been interested in how this experience affects, organizes and/or directs behavior generally.

Briefly put, although there is a lack of agreement in definition of self and no one theoretical point of view which is dominant, there is some coherence in the literature. Most of the research and theory may be seen as either explicating the nature of self as an object or as attempting to specify or delineate how self may serve as an organizer or effector of behavior, as Hall and Lindzey (1957) also seem to suggest. This paper, then, will be directed toward answering two questions: (1) What do we know about the nature of self-experience? (2) How does experience of self determine or affect behavior?

THE ANALYSIS OF SELF-EXPERIENCE

In some general sense most theorists tend to agree that the self is a concept. Therewith it is also assumed that the self should have properties and function in a manner which is not totally dissimilar from other concepts. That is, it should exhibit a course of development and exhibit change which is directly attributable to stimulus input. More specifically, most would express substantial agreement with G. H. Mead (1934) and H. S. Sullivan (1953) that it is the social experiences or the reactions of "significant others" which are of primary import in determining development and change in the self. It is with respect to this central hypothesis of self theory that research has revealed the most clear-cut and unambiguous answers.

In an earlier review of the literature, Wylie (1961) emphasized that one of the serious limitations of self research generally was that it consisted almost solely of correlational studies, or what she termed R-R studies. This criticism was likewise appropo of research purporting to study change and development in the self. Researchers typically did not manipulate stimuli in order to observe consequent changes. Rather, they were content to correlate selected environmental situations with certain measures of self-regard. Thus, in a study by Helper (1955, 1958) children's feelings toward self were correlated with parents' feelings toward the children. The assumption was that the correlation between these two measures would indicate that the children's concept of self was in fact influenced by the parents. Similarly, other studies which presumed to show the direct relationship between the reaction of significant others and the nature of self-regard tended to prefer or be content with this limited approach (Manis, 1955; Miyamoto and Dornbusch, 1956, Rosenberg, 1963).

This criticism is no longer applicable today since there is a growing amount of research evidence which has applied what Wylie (1961) termed an S-R or experimental type design in determining development and change in self-regard.

Research designed to test certain propositions stemming from Festinger's theory of cognitive dissonance (1957) or one of a number of balance or congruency theories (e.g., Secord and Backman, 1961; 1964) has in some cases directly and in other cases at least incidentally provided an adequate basis for specifying the role of others in effecting changes in self-regard (e.g., Bergin, 1962; Backman, et al., 1963; and Secord, et al., 1964). In general, the procedure employed in these studies has involved obtaining a pre-treatment view of self, then introducing a standardized evaluation of the person which presumably originated with an authoritative source of some kind, a friend, or fellow subject in an experiment. Similarly, a series of studies initiated by Videbeck (1960) and continued by the author and his colleagues (Maehr, et al., 1962; Haas and Maehr, 1965; Ludwig, 1965; Ludwig and Maehr, 1966) has provided further relevant evidence. In these studies the primary purpose was to determine in a direct manner the effect of the evaluation of significant others on the individual's expressed feelings toward self. Unlike the previous studies Ss were not merely presented with written communications which presumably stemmed from significant others. Rather, in these studies significant others appeared in person while they evaluated the subject. These studies involving direct confrontation between significant others and Ss eventuated in clear-cut and durable changes in self regard. In one study (Haas and Maehr, 1965), changes were observed to persist over a six-week period. In each of these studies changes were noted not only in areas directly evaluated but in related areas as well, and in one study (Ludwig, 1965; Ludwig and Maehr, 1966) subjects not only changed in their expressed attitudes toward self but also expressed different preferences and interests subsequent to the evaluation.

This pervasiveness of change is particularly noteworthy. It would seem to indicate that experimental treatment in these studies involved more than the simple reinforcement of a verbal operant. At least it is interesting to note that studies which have attempted to effect changes in self-referral statements by means of operant conditioning procedures have not consistently nor clearly exhibited such pervasive effects (Rogers, 1960; Babbitt, 1962; Koenig, 1966). However, this is not to deny that methodologically the research thus far has really not gotten appreciably beyond the stage of verbal response correlation even when an attempt is made to explicate the motivational role of self-regard (see below).

In sum, the evidence is quite unequivocal on one point. The evaluation of significant others has been demonstrated to effect definite and probably persistent and pervasive changes in at least verbally indexed self-regard. However, even within these qualified limits not all the critical parameters have been identified. To this reviewer there seem to be five unanswered questions of special significance.

Significance of the other. It should be patently obvious that not all others are equally significant and therefore their criticisms, approbations, and general reactions are not equally effective in self concept change. The question is, what is the nature of such social power? Who has it and under what conditions? For an answer to such questions one may extrapolate from various areas of social psychological research. Thus the work of Bandura and Walters (1963) on imitative behavior in children, plus countless studies on attitude change and general social influence processes would all be of value. However, there is a distinct paucity of studies which deal directly with this problem in a self-theory context. To say the least, this is somewhat surprising in view of the fact that a theory of self would seem to lead ineluctably to just this type of research.

Individual differences. A second critical and insufficiently answered question deals with what might be loosely termed individual differences in self concept change. In the studies cited previously in which an attempt was made to systematically manipulate self concepts, it was apparent that not all Ss were equally changeable.

This is not particularly surprising and in itself hardly noteworthy. What should claim our attention here is the problem of uncovering the presumed regularity which underlies such variation. Again, one may extrapolate from large amounts of empirical data gathered in connection with the study of other social influence situations. For example, one may consider change in self-regard to be a special type of conformity behavior. Thus one could further assume that the dimensions involved in self concept change are similar to those identified in Crutchfield's (summarized in Krech, et al., 1962, ch. 14) intensive study of individual differences in conformity behavior, using an experimental approach similar to that developed by Asch (1956).

In short, although there is evidence which has some bearing on this issue, this second problem, like the previous one, has really not been subjected to direct and intensive study.

Approval vs. Disapproval. The third critical problem area deals with the differential effects of approval and disapproval treatments. In several studies the findings did suggest that these two types of reaction do not merely have parallel opposite effects. For example, Videbeck (1960) and Maehr, et al. (1962) found that the gradient of generalization from criticized areas of self regard to related areas was steeper in the case of disapproval treatment than in the case of approval treatment, suggesting that the disapproval communication was not so readily incorporated into the self system, but rather retained as a communication dealing with peripheral affairs only. In studies in which the effect of approval-disapproval treatment on self concept was observed over a period of time (Haas and Maehr, 1965; Ludwig and Maehr, 1966) the two treatments likewise did not operate in a directly opposite fashion. There was some suggestion of a greater recovery in the case of disapproval treatment. It must be added, however, that disapproval was somewhat unpredictable in its effects, a finding that is quite in accord with a half century of research on the effects of reward and punishment in effecting behavioral change. It is interesting to note in this connection that studies which have attempted to change self-referral statements in the manner of operant conditioning have found that reinforcement for positive self-statements was less effective than reinforcement for negative statements (Rogers, 1960; Koenig, 1966).

The problem, of course, is one of delineating more precisely the effects of disapproval and determining why the two treatments are not opposite sides of the same coin.

Developmental Changes. A fourth area which deserves study concerns the matter of changes in self-perception in the course of development. This is virtually virgin territory. Wylie (1961) reports that no longitudinal studies were available at the time of her review and the situation has not changed appreciably to the present. Also, it is somewhat difficult to piece together a picture of the evolving sense of self from the data that are available. Ames (1952) has made an admirable attempt to construct a picture of the course of self concept development from the first month until the age of three and one-half. A cross-sectional study by Bloom (1961) has provided some insight into the self-regard changes that occur in the adult male from the period of young adulthood to old age. Other studies (e.g., Mussen and Jones, 1957; Engel, 1959) have focused on transitional periods in development, such as adolescence. Yet the picture is quite incomplete. Again, one can extrapolate from other research and engage in a bit of speculation--as most developmental texts are forced to do--but truly acceptable empirical evidence is extremely limited.

Dimensions of Self-regard. Finally, it may be noted that the literature has repeatedly implied that there are different aspects of self-regard. William James (1890, Vol. 1, p. 294) suggested that there are as many selves as there are persons who are significant to the individual and the plethora of self labels is in some ways attributable to the fact that self-experience is a multivaried phenomenon. Each theorist has dealt with this situation in his own way. Rogerians are wont to talk about a phenomenal self which is comprised of "real" and "ideal" concepts of self. Allport (1955) has talked of a proprium

with its "bodily sense," "self-identity," "self-image" and other aspects. Furthermore, there is a growing amount of literature on the so-called "body-image" (cf. Fisher, 1964)
and it is not quite clear exactly how this relates to other designated "selves." The fact of the matter is that although these various ways of slicing the pie may have some literary value they do not suffice for the development of a scientific theory of self-regard. What is needed is a program of research which would culminate in some type of "self-space." At present, there is little or no information regarding the dimensions of self experience. Is whatever is called "body image" rightly categorized as a set of cognitions logically separable from "self-identity"? Along what dimensions does the experience of self vary? These are important but inadequately answered questions.

It is gratifying to note that several factor-analytic studies have attempted to get at this issue (Smith, 1959; 1960; 1962). But it is clear that it is still any theorist's guess as to how the self might be properly subdivided, if at all.

These, then, are five problem areas which, it is suggested, are critical for developing a theory of self and yet not fully researched nor clearly delineated in any existing theorizing. It is true that the various balance or consistency theories (cf. Heider, 1958; Festinger, 1957; Secord and Backman, 1961, 1964) do provide a frame of reference from which one can make certain specific predictions regarding change and development in the self concept. However, as far as providing a fitting explanation of change and development in self-regard these theories are notably lacking in at least two respects.

First, they are, admittedly, interactional theories and thus tend to deal with the contemporary that of the situation rather than with the developmental how. Thus, for example, these theories suggest how a person who is perceived as significant will effect self concept change. They do not, however, provide a basis for predicting who will be significant to a given individual, why he will be significant and under what conditions. Second, it may be noted that these theories provide a conceptual basis for explaining individual differences in self concept change only in certain limited respects. Individual differences are accounted for primarily in terms of the unique interaction of communication source, character of the communicator, and the subject's current attitudes or cognitions relevant to the situation. These theories virtually ignore the underlying individual and unique modes related to absorbing, integrating or rejecting new information. The point is, that for these models to be truly valuable in developing a theory of self they would have to be complemented by cognitive theory which has focused on just such questions of "cognitive style" (e.g., Harvey, et al., 1961).

THE SELF AS DOER

Thus far we have reviewed research, theories, and models with a special view to describing changes in the self. In other words, self has heretofore been considered as a dependent variable, the object of some type of stimulus input. One may safely conclude that the most extensive and also conclusive work has been relevant to this particular aspect of the problem. At the same time it may be argued that one of the most intriguing and simultaneously unexplored possibilities involves employing self as an independent variable, as a determiner and effector of behavior.

As has already been mentioned, most theorizing has at least implied that self factors influence and determine behavior, and some theories employ a self-regard construct as the prime motivational concept. Furthermore, a variety of studies exist which claim to shed light on one or another effect of particular views of self. Measures of self-regard have been correlated with a presumably independent measure of personal or social adjustment (e.g., Berger, 1955), persuasibility (e.g., Levethal and Perlow, 1962), popularity (e.g., Horowitz, 1962), and school achievement (e.g., Wattenberg and Clifford, 1964) to mention but a few of the instances.

Although these studies have yielded a rather interesting complex of correlates, they have had limited value in demonstrating that self-regard is truly an antecedent of certain specified behavior patterns. Thus, for example, it is interesting to know that positive self-regard has at least a slight relationship to acceptance of others or acceptance by others, or that high self-regard is positively related to popularity, and negatively related to persuasibility. However, unanswered is the question of whether or not it is the self-regard that leads to such effects--and if so, how? In other words, in those studies in which self has been assumed to be the dependent variable it is dubious whether it actually was. Clearly, the role of self as an independent variable has not typically been adequately handled. Thus the findings are at the least ambiguous and definitely lacking in specifity as to how self leads to or is followed by certain behavioral patterns.

The root problem here seems to be principally one of inadequate theorizing. Although many theories have utilized self as an important motivational variable or as some type of behavioral conditioner, the formulations have not eventuated in a coherent and internally consistent set of predictions. Typically, the suggestion in a given theory has simply been that behavior proceeds from a presumed basic, underlying need to "maintain and enhance the self," without further specification or elaboration. Such a general formulation would quite obviously be limited in its predictive power. It is simply too vague to have much use.

A notable exception to this generalization is at least implicit in the "Interpersonal Congruency Theory" of Secord and Backman (1961; 1964). In this system the person is viewed as striving to maintain a balance in three component parts: (1) self, or a particular aspect of self-experience, (2) a person's interpretation and evaluation of his behavior relevant to that aspect of self, (3) and his beliefs concerning how another behaves or feels toward that aspect. A state of congruency exists whenever these components are in essential agreement. Since social behavior customarily forces some type of imbalance, behavior typically involves attempts to aright this situation. For the present purposes the important point is that certain specific behavior patterns are predicated on the assumption of a pattern in the self-other system. Thus one can predict quite specifically the behavior that will follow from a particular view of self or what type of action will be taken to retain or recover balance in the self-other system. Similarly, Festinger's theory of cognitive dissonance has been applied to the vagaries of self-cognition with some success (cf. Bergin, 1962) In Festinger's thinking (1958) any type of cognitive imbalance or cognitive dissonance is motivating. If two particular concepts held by the person are dissonant a motivating state exists, he is 'driven to' establish some type of consistency in his thinking. When self is considered simply or at least primarily just another class of cognitions, then it follows that inconsistent views of self create a motivating condition. Or, to put it differently, the person is motivated to maintain or regain consistency in this picture of self as well as his picture of other and it. Again, it should be emphasized that the theory suggests how self-cognition might be inferred and under what conditions a particular view of self will lead to certain specifiable behaviors.

Besides providing a framework within which one can relate self-regard to specific behavioral outcomes, these theories contain certain other advantages as well. Both "Interpersonal Congruency Theory" and "Cognitive Dissonance Theory" clearly treat self as part of a larger cognitive system. Thus the postulated or hoped for laws regarding other aspects of cognition presumably apply equally to self, a parsimonious theorizing to say the least. Furthermore, treating self as part of a larger cognitive system helps to guard against the reification of self, an old problem in self theory which has not yet been entirely disposed of.

This is not to say that either of these theories is without its problems. Aside from the general criticisms that can be and already have been made of dissonance theory (cf. Chapanis and Chapanis, 1964) and which are to some extent also applicable to interpersonal congruency theory, there is a more basic criticism.

It is obvious that these theories are based on an essentially homeostatic model of the organism. That is, they are predicated on the assumption that the organism is designed to work toward reducing tension and achieving a quiescent state of affairs. The ideal state is the stable state, the state of limited imbalance and minimized change. All behavior, then, may be viewed as essentially an attempt to achieve equilibrium and balance. Persons change attitudes, alter perceptions, make different choices in order to maintain such an equilibrium in the cognitive system. When such an approach to cognitive theory is applied to the cognition of self it would presumably be predicted that, other things being equal, individuals will choose behavioral alternatives that are congruent with their concept of self and avoid those alternatives which are incongruent and presumably upset the system.

In many respects this seems quite logical. In behavior generally, individuals do seem to behave with a view to maintaining some type of balance or equilibrium. However, there is good reason for questioning the validity of such a homeostatic model in constructing a general theory of behavior as well as a more specific theory of cognition. It is well to recall that behavior models of this type are under sharp attack in psychology generally on the basis of a growing amount of evidence from quarters as diverse as neurophysiology, learning theory and personality theory (cf. Hebb, 1955; Berlyne, 1960; White, 1959, 1960; Butler and Rice, 1963; Walker, 1964). On this basis alone it would seem appropriate to ask whether such models, while rejected or at least seriously questioned in related areas, are somehow especially suited for developing an explanation of the vagaries of cognitive behavior. Does the person want and/or need a consistent and coherent cognitive world above all else or is such consistency, once approached or achieved, just as much a bore as an environment of reduced stimulation (cf. Bexton, Heron and Scott, 1954). Perhaps individuals risk cognitive dissonance, inconsistency and imbalance as much as they obviously risk physical pain and upsetting stimulation. At the very least, it is questionable whether individuals just absorb information and select experiences which luckily fit their presently construed picture of self, other and it. For example, in a study by Freedman (1965) Ss clearly preferred dissonant information over consonant information. Furthermore, balance and congruency theories have paid scant attention to the possibility that under certain conditions persons may selectively perceive information and choose behavioral paths which are incongruent with a present view of self but are in accord with hopes and an ideal or projected self.

Harvey and Clapp (1965) have likewise called attention to this possible limitation of balance and dissonance theories. They suggested that under certain circumstances persons are not only open to the expected or congruent but also the hoped for. Thus they predicted that in contrast to dissonance theory Ss who were low in self-esteem should be more adversely affected by negative communications concerning self and more positively affected by positive communication than persons high in self-esteem. They reasoned that persons lacking in self-esteem (who probably do not customarily receive positive feedback) should be more sensitive to its absence or presence. Their results do not support the hypothesis. Rather results showed that Ss of lower self-esteem were more adversely affected by negative feedback but were also less positively influenced by approving reactions. These results suggest that low-self-esteem Ss can more readily incorporate negative information than high-self-esteem Ss and less readily accept positive information regarding self, findings which would not deviate appreciably from the predictions of dissonance theory. However, it may be questioned whether this means that in all situations expectancy takes precedence over hope. As a matter of fact, Harvey and Clapp's results do suggest that at least the high self-esteem Ss moved in the direction of hope. In any case, the question must be explored: Is behavior proceeding from self-cognition conditioned only by a congruency principle or is it also directional in the sense that the person may at times select information about self and choose behavioral alternatives which are not congruent with present self-perception but which accords with hope? This question deserves further scrutiny.

CONCLUSION

We have attempted to review the literature which has a bearing on two central questions of self theory. The goal has been to point up theoretical issues as well as review empirical findings. In attempting to achieve this goal certain methodological problems, such as the problem of measurement (cf. Wylie, 1961; Crowne and Stephens, 1961; Strong and Feder, 1961) have been virtually ignored. This is in part attributable to limited space but it also reveals a more or less consciously constructed conclusion of the author. Before one can expect, hope or plan for methodological sophistication in this area the general theoretical structure of what has come to be called self-theory must be clarified and elaborated on if talk about self is to become more than a literary exercise. We have tried to indicate that as self is dealt with in the context of general "cognitive theory" there is some hope that this may be achieved.

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CHAPTER II

COMPETENCE REVISITED

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Several years ago Robert White published a provocative article, entitled "Motivation Revisited: the concept of competence" (White, 1959). This article and its companion (White, 1960) was directly critical of Freudian and other theories of motivation which were based on a simple maintenance, homeostatic or drive-reduction model of human behavior. White argued that human behavior is characterized as much by seeking new pain as it is by reducing it. Pointing specifically to the development of the child, he referred to the re-occurring tendency to be curious, to rise to challenges, to try the new rather than the tried and true. In short, White suggested that behavior was as much characterized by its risk of system imbalance as by its attempt to achieve states of equilibrium.

Unfortunately, those provocative papers did not eventuate in an extensive program of research on competence motivation. As a matter of fact, few researchers seem to have specifically taken up White's challenge and the construct competence exists today as an interesting, oft-repeated idea, but not as a core concept integrated with a set of confirmed hypotheses. Doubtless there are many reasons for this. In retrospect one can see that White's proposals were part of a larger Weltanschauung and possibly just got lost amidst the plethora of theory and notion that challenged classical drive theory. It can also be noted that White seemed to be talking more of a general developmental scheme than of a motivation construct, which in itself would preclude or at least not facilitate a program of research. Above and beyond this White may be criticized because he did not clearly tie his construct to a more general theory of behavior nor did he explicate the specific questions which his theory was to answer. Nevertheless, the papers had and have great heuristic value. Furthermore, the construct, competence may be worth salvaging. In any case, it is the interest of this paper to consider some of the reasons why competence has had limited utility and to suggest ways in which White's basically sound notions can be operationalized. Or, to put it somewhat epigrammatically, we propose to follow White and reconsider motivation but to also do him one better and reconsider competence as well.

MOTIVATION CONSIDERED AND RECONSIDERED

With Freud psychology supposedly became dynamic; that is, interested in motivational questions . However, beginning with Freud and continuing to the present there has been little agreement as to precisely what it was interested in when it was interested in "MOTIVATION." Proceeding from the etymology of the word one might suspect that the study of motivation is simply the study of what moves the person or animal. But in the final analysis this question is as wide as psychology itself. With a little effort all psychology could be comprised under the question: What moves behavior?

This confusion over what problems rightly fall under the rubric "Motivation" has led some to question the value of the notion or to eschew it altogether, and certainly, all would admit that when certain problems of behavior are considered it is a bit pointless to attempt to decide whether the problem is one of motivation, learning, perception or whatever. Furthermore, it may be granted that all the traditional problem areas of psychology may be reduced to a study of stimulating events and correlative responses and it is an arbitrary matter to categorize these various stimulus-response events and label them in different ways. Be that as it may, it would seem that there is some value in talking about "motivation," especially when one is dealing with complex human behavior. Here even a crude taxonomy may be of value in ordering the complex array of events that comprise the person's interaction not only with a variety of objects but also a multiplicity of persons--perceived, remembered or imagined. In any case, this paper operates with the assumption that some such ordering of behavior may be helpful and that traditional notions of motivation can be made to refer to definable behavioral situations and/or events. The question then is, what are the problems to which one addresses himself when he presumes to study "motivation"?

A survey of the literature will reveal that whenever motivation is spoken of, the author typically has at least one of three different problems in mind. A first problem concerns the energizing or activation of behavior. What provides the fuel or 'go-power' for behavior? The second problem concerns the patterning or directionality of behavior. Why does the person engage in this rather than another task? The third problem involves explaining the persistence of behavior. Why does a person continue at a task when other possibilities are open to him?

Interest in the first motivational question is to be found primarily but not exclusively among those who see their work as either directly or potentially physiological in nature. Among those theorists who are primarily interested in explaining complex human behavior the first question recedes in importance and the latter two loom as the fundamental problems. That is, in focusing upon complex human behavior there seems to be less of a tendency to be directly concerned with what accounts for variation in activity level, what provides the "go-power" for behavior, etc. Rather, the problem is left to those theorists whose area of concern lends itself well to a reductionistic analysis, since the first question is a question which demands or at least points to this type of analysis. Theorists interested in human motivation, then, have typically and, in the author's view, quite understandably assumed at the outset that the organism is active and taken it as their burden to explain (1) why the person is active in one way rather than another (2) and why a given person persists at a task under certain conditions and not in others, or persists when others have given up.

Thus in dealing with complex human behavior two major questions may be viewed as preeminent, the question of directionality and the question of persistence. Moreover, it may be further suggested that these two problems can profitably be viewed as different examples of the same problem. They both involve the explanation of choices that the person makes. In one case (directionality), it is a question of explaining how S at one particular point in time comes to choose one alternative over others which, at least from an external point of view, are equally accessible to him. In the second case (persistence), the question is one of explaining how a given alternative is repeatedly chosen over a period of time while competing alternatives are rather consistently rejected. In other words, both problems may be viewed as special instances of choice behavior and the behavior related to these situations can be profitably approached from a choice and decision theory model as Taylor (1961) also suggests. The task of motivation theory then becomes one of developing a set of interrelated constructs from which choice can be reliably predicted.

Now in having placed motivation in the choice and decision theory "camp" the problem which this paper purports to solve has still not been adequately defined; several assumptions and the general frame of reference must still be made more explicit.

First, we begin with the assumption that complex human behavior as well as those specific behavior patterns referred to as social behavior may be profitably viewed as problem solving behavior. That is, from the person's point of view his life consists of a series of identifiable situations which have the following components: (1) an objective or goal to achieve, (2) a barrier or barriers to the objective, (3) and alternative pathways to the objective. Since there is some uncertainty regarding the outcome and/or no definite prescription of pathways the situation may be described as a "problem to be solved." This, as we see it, is the general outlay of the situation, but it must be hastily added that things are typically more complex and involved than this. Thus we are more accurate if we speak not only of a "problem to be solved" but of "problems to be solved."

As the laboratory rat in his natural state is seldom in a truly deprived state so the person in his natural state is typically not in a situation where he is in effect told: "Do this problem -- or else!" To be sure, such situations do occur but we would be in error if we assert that they are the norm. Furthermore, it may also be suggested that we are doomed not only to an incomplete but also to a hopelessly biased theory if we make the 'one problem situation' a PARADIGM for all behavior. In any case, it is proposed here that we make a distinction between the one problem and the multiple problem situation. The former is basically a maintenance operation in which the organism selects a behavioral path which has the highest subjective p of eventuating in problem-solution. To put it differently the S does not take risks. In the multiple problem situation, however, S may be expected to actually avoid the "sure bet," to not minimize risk and actually to take chances, as it were. In other words, in confronting a series of available problems-to-be-solved S will select one which the layman would describe as "challenging." Although this seems like a very simple-minded observation it may contain a very powerful principle if we conceptualize complex human behavior as essentially problem-solving behavior. Subsequent comments represent an attempt to elucidate this principle in what we have termed "the multiple problem situation."

COMPETENCE RECONSIDERED

Having described the broad frame of reference in which we are operating we must now get down to specifics. Granted our interest in the multiple problem situation, how does one predict what problem will be chosen and under what circumstances? As is well known choice and decision theory have talked variously about reinforcement and utility at this point. Fine and well! It is suggested here, however, that another factor might also be given consideration: the concept of competence. However, this construct has value only as it can be revised somewhat. Specifically, we suggest that competence be redefined as subjectively judged competence and therewith go on to make two assertions. The person will choose to solve that problem which he (1) feels competent to solve (2) and which is important to him to solve. This says very little and we must go on to state more specifically what we mean by these feelings of competence and under what conditions a particular feeling of competence will be of value to the person.

At the simplest level we may simply define feelings of competence as a particular kind of verbalization of S or a response on a rating scale which asks S how competent he feels at various tasks. Similarly, value can be defined as "what the S says is important" and may likewise be measured by rating scales. Thus in a study conducted by the author Ss were presented a series of tasks and asked to rate (1) how competently they felt they could perform these tasks (2) and how important it was for them to do well on these tasks. As far as the Ss were concerned the study was concluded at this point. A week later, however, Ss were presented with the same tasks, described as "tasks which are good indicators of success in certain vocations," and asked which ones they would actually like a chance to work with. They were told further that there probably would not be sufficient time for all of them to work on all of the tasks. Therefore, they were asked to rank the tasks in a preference order so that the Es could insure that they at least got to work on the ones they really wanted to. This concluded the experiment and provided the Es with the following data: Measures of feelings of competence, the importance or value of a particular competence and an index of what S might choose to do in a relatively free (i.e., "multiple problem") situation.

Superficially, this seems to be only a study of how rated interests are related to actual behavior, but closer scrutiny reveals that it is more than this. In the first place as far as the author is aware, research on interest patterns has not fully explicated the structure of the construct interest. That is it has not fully defined how a person's interests might be rooted in particular notions about self and the scale of values that he has. But more than this, the results are interesting in that they do in fact suggest a set of constructs, which can be readily operationalized, and which appear to have considerable power in predicting choices in complex behavior situations. Thus it was found that when S's competence and value ratings were considered together they were very capable of predicting when a given task would or would not be chosen.

But the fact that this or any set of variables is sufficient to account for a considerable portion of choices made is not a satiating experience for the theorist. How do these variables come to have this effect? What is judged competence and how does it develop? How do value and judged competence interact in determining choice?

On the basis of the foregoing discussion it is clear that we are assuming that S behaves so as to maximize or at least "optimize" what might be called success experience. Essentially we predict that S chooses to do those things he can do well and which he considers "doing well" to be important. The first question we must answer is, of what does "success experience" consist? This question cannot be fully answered but three interrelated hypotheses can be proposed. Success or success experience follows when (1) S has done something which is important to him, (2) which involves a degree of risk or some uncertainty in outcome (3) and which is followed by information denoting a competent or successful performance. Consider a study conducted by Videbeck (1960) which has served as a paradigm for a series of studies (Maehr, et al., 1962; Haas and Maehr, 1965; Ludwig and Maehr, 1966) attempting to explicate the essential elements involved in what we are calling the development of judged competence. The Ss were superior students in speech. They were selected on the basis of their judged high degree of interest and achievement in speech and drama classes at the University of Nebraska. We may assume, then, that they had a pre-experiment interest in performing competently in the area of oral communication. These subjects were told that they were selected to participate in a contest in which their skill at oral reading would be evaluated by certain speech and drama experts. Here we have the note of uncertainty. We may assume that these superior students did not expect to fail completely in this situation. In other words, their probability of success was at least >0.00. On the other hand, the "contest" represented some possibility of failure (P success <1.00) since they were to be evaluated by visiting experts whose responses were not entirely predictable. More to the point, unless they were so grandiose as to assume that they would be successful in every speech situation this new situation represented some risk or uncertainty. The "contest" consisted of Ss reading certain selections in the presence of the experts. Following this, Ss were given either a standardized approval or disapproval evaluation by the expert. In other words some agent of the society of which S was a part was defining success or failure. We would predict that this is precisely the kind of circumstance under which the feeling of competence will develop and/or increase, assuming of course that S was administered the approval treatment. As the reader might surmise this is precisely what has been shown to occur in a variety of such situations, although it must be admitted that the specific role of risk, the parameters of the variable, "success information," and the value variable are largely unexplored.

Our theory of motivation, then moves from the tenuous

$$\boxed{\text{Judged-competence}} + \boxed{\text{value}} = \boxed{\text{choice}} \qquad \text{to}$$

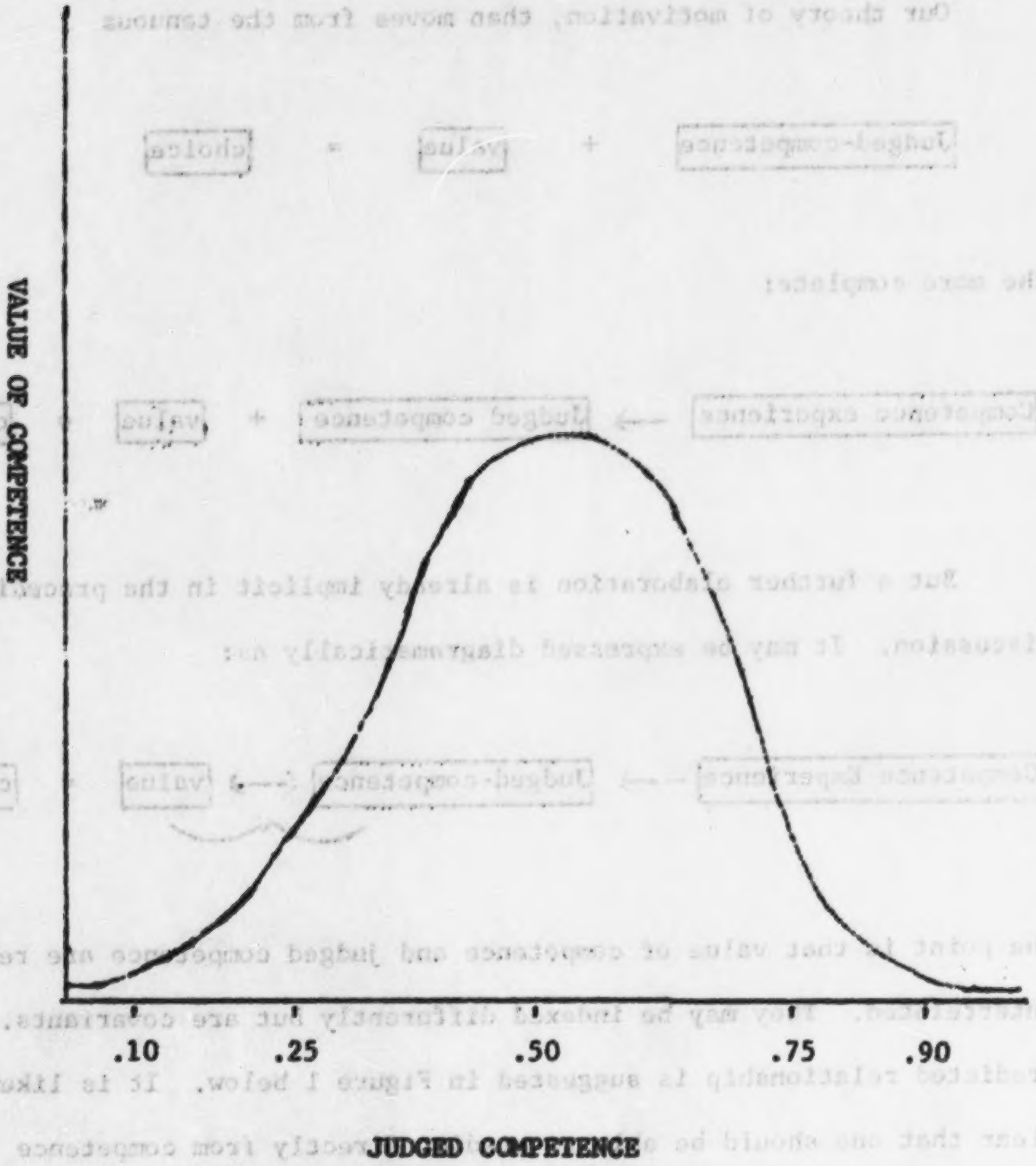
the more complete:

$$\boxed{\text{Competence experience}} \longrightarrow \boxed{\text{Judged competence}} + \boxed{\text{value}} = \boxed{\text{choice}}$$

But a further elaboration is already implicit in the preceding discussion. It may be expressed diagramatically as:

$$\boxed{\text{Competence Experience}} \longrightarrow \underbrace{\boxed{\text{Judged-competence}} \longleftrightarrow \boxed{\text{value}}} = \boxed{\text{choice}}$$

The point is that value of competence and judged competence are really interrelated. They may be indexed differently but are covariants. The predicted relationship is suggested in Figure 1 below. It is likewise clear that one should be able to predict directly from competence experience to choice. Thus knowing that S has received "success information" 50% of the time on task A and 90% of the time on task B it would be predicted that if he is given a choice of performing one of the two tasks he would choose task A--assuming, of course, that this is truly a multiple problem situation.



(Expressed in Terms of Subjective Probability of Success at a Particular Task)

Figure 1. Theoretical Relationship Between "Judged Competence" and "Value of Competence."

In sum, we have two different ways of indexing judged competence and value of competence. The rating scale index aside from being a convenient method within the context of certain types of research designs also suggests that judged competence may be profitably considered as a

trait variable--a cognition which is not limited to one particular situation but which has a generalized effect on choice-situations. However, we have also suggested quite specifically how both rated competence, value and choice are tied to stimulus input. Thus, the construct competence as we have redefined it can serve as a "state" as well as a "trait" motivational variable.

A RECONSIDERATION OF COMPETENCE: SOME IMPLICATIONS

There are several important implications to be derived from this reconsideration of competence. We will confine ourselves to alluding to two such implications. First, we will attempt to illustrate the utility of competence as a state motivation variable by reference to research on human learning. Second, we will suggest how competence can serve as a trait variable, i.e., as an important variable in personality theory.

Reinforcement Theory. It must be admitted by almost any knowledgeable reviewer that reinforcement theory, be it the Hullian, Skinnerian or some other variety, is a very powerful tool in predicting choices that lower level organisms will make when they are highly motivated. However, Reinforcement Theory is considerably less powerful when motivation is moderate and the organism is complex in nature, situations which it might be added, typically obtain in human behavior. The problem of moderate motivation is a potential dilemma for reinforcement theory. The matter of decreased power when the principles are applied to the more complex situation is, of course, to be expected. However, the two problems combined may argue for a rejection of Reinforcement Theory in predicting behavioral choices in human learning situations.

Consider a rather simple situation drawn from Skinner's area of activity, the performance of a reasonably bright college Freshman attempting to work through a linear type programmed book designed to teach him elementary statistics. One may deduce from Skinner's work that, *ceteris paribus*, the subject will persist at the task if he is repeatedly administered some type of reward. That is, he will choose to stay with the programmed learning task rather than opting out for some other alternative, such as reading a book, calling up his girl friend, etc., if he is sufficiently *rewarded* for the task. Now what is considered to be reward, or more accurately, reinforcement, in this situation? As we scrutinize this we find that it is simply a matter of "being right," "getting the correct answer" as opposed to being wrong. This is a nice operational definition of reinforcement in this particular situation. Furthermore, we might have here a measurable variable from which we can predict choices in at least this type of situation. But as we move away from programmed learning of elementary statistics to the learning of a particular physical skill as e.g., dribbling a basketball do we have any clue as to what the appropriate reinforcement might be? In other words, what is the "nature of being right"? What are the general principles for defining what "being right" will be in any given situation? The point here is that there is only limited information provided within the confines of Skinner's theory which would help us to predict choices under a variety of situations. Furthermore, it may be questioned whether even the "being right" variable is a good predictor of behavior on a linear program teaching device. The author's own observation would indicate that "being right," may and often does become quite "boring" to the student, especially if he is quite bright. Even if a particular behavioral pattern promises to "prove him right" he will choose another where he runs the risk of being proven wrong. Reinforcement cannot be the sole explanatory variable in explaining the direction of behavior.

The revised concept of competence represents some improvement over this state of affairs. First, there is a suggestion as to what will be reinforcing across a wide variety of situations, viz. competence feedback. Secondly, the revised concept of competence has incorporated the findings of recent motivational research and assumed an organism which may be both drive reducing and drive-inducing. In other words, we have suggested some basis for predicting the direction of behavior even under conditions of moderate motivation.

But there is at least one other important implication that can be derived from our notions of competence. This implication relates to what may be called personality theory. If it is assumed that competence motivation is regularly a part of behavior then it can be readily seen that personality must be viewed as an open system; regularly changing its "goal objects" and therewith acquiring variable and somewhat unpredictable stimulus feedback. In other words, the less a person is tied to maintenance operations (one-problem situations) the more his behavior should exhibit a tendency to avoid the sure and obvious and opt for what contains a moderate amount of risk. To the external observer, judging on the basis of social conditions and norm groups his behavior would probably be termed "unpredictable," "spontaneous," or even "autonomous." As a matter of fact we would suggest that some of the notions of humanistic psychology which emphasizes the uniqueness of the person, his flexibility, autonomy and unpredictability may simply be observations of the outcomes of behavior in multiple problem situations.

To turn this around, it may well be that we have suggested here a way in which vague and diffuse ideas such as "self-actualization" may be operationalized and dealt with not only scientifically but quantitatively.

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CHAPTER III

VERBAL STYLE AND CONCEPT LEARNING[1]

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I. INTRODUCTION

In this study, the notion investigated was that certain more or less syntactical indicators of verbal conditionality--which has to do with the evaluation of contingencies during the symbolic consideration of alternative courses of action--are related to 'flexibility' of cognitive functioning. Subjects differing in degree of conditionality as assessed from a fairly 'free' interview performed tasks designed to partially validate the construct of conditionality as being important for human information processing. The tasks chosen were a simple concept acquisition problem and a variation of it to measure rigidity viewed as lack of sensitivity to negating feedback. These tasks were interpreted in information processing terms; and the general argument was that the probability of occurrence of certain plainly denotable verbal "operators" such as if, or, and maybe during an interview in which the person could describe plans for behavior would affect the way he processed information in situations not directly related to the interview. Such was indeed found to be the case.

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[1] The research reported here, in a somewhat different form, constituted part of a dissertation presented to the faculty of the University of Missouri in partial fulfillment of requirements for the PhD, 1966.

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The view of man an information processor taken here draws heavily on the formulations of Miller, Galanter, and Pribram (1960), who speak of Plans for behavior in their analysis of cognition. A Plan is abstractly identical to a computer program--a sequence of operations for storing information, moving it around, comparing symbols with other symbols, and modifying symbols. Miller and his colleagues speak of these Plans as consisting of TOTE units (an acronym for Test-Operate-Test-Exit), which are in effect subroutines with feedback, arranged hierarchically.

As a simple example of a TOTE unit, Miller and his colleagues describe a 'program' for the act of hammering a nail. First, the operation of bringing the hammer down is performed. Then a test is made: did the hammer strike the nail? If not, the operation is performed again. When the nail is hit, a further test is performed; is the nail flush with the board? If not, the whole sequence of operation, test, operation, test, and so on, is performed until the final test is satisfied: when the nail is flush with the board, control is shifted to some other TOTE, for instance one for painting the board.

TOTE units can be quite complex, having rather complicated tests and the ability to branch to various actions upon the results of a test. The tests performed may be strictly internal, as when one searches for the right word and checks various words drawn from memory against several criteria. And the TOTE unit may be a part of other hierarchical structures. For instance, the TOTE unit for hammering the nail may have been part of a larger Plan for making a bookcase, and may have been chosen as a result of some test for probable effectiveness in which it was contrasted with a Plan for glueing the boards together.

For purposes of assessment, the focus of this study is on verbally mediated Plans and their characteristics. Among those characteristics singled out as being relevant to the general notion of 'flexibility' are the following. First, the Plans may involve varying amounts of alternation. Varying numbers and kinds of alternatives may be conceived at various points in a larger Plan. The verbal device that most clearly signals the generation of alternatives is "or," and related words such as "on the other hand." Once alternatives are generated, then testing may be performed to choose among the alternatives. "If" and other conditional adverbial clauses signal tests. The outcome of a test would generally be a branch, in programming terminology, to one of the alternatives (or perhaps a further test). Prior to alternative generation or testing is the ability to operate in a hypothetical mode. Modal auxiliaries such as "might," or "could," indicate such functioning. When a person is operating hypothetically, the fecundity of his alternative generation and testing procedures would appear to be involved in any characterization of the flexibility of his Plans or information processing routines.

The verbal indicators mentioned above serve as structural elements in verbal Plans. It is assumed that their usage is a stylistic trait of the individual, and holds to some extent across many kinds of verbal planning and, more generally, verbally-mediated functioning. It is also assumed that the kinds of structural characteristics implied by the existence of these verbal operators in verbal plans may also hold for not strictly verbally mediated functioning. It would be difficult to separate the strictly verbal and the non-verbal, of course; but both are thought to operate to some extent in the tasks described below.

Before describing the concept acquisition experiments, however, some attention will be given to the measurement and characteristics of the verbal indicators without reference to any dependent variables. In section II below, the measures are described, and a study is reported in which undergraduates served as coders. In Section III, the concept acquisition tasks are described. Finally, in the concluding section, other evidence pertaining to the empirical validation of conditionality is cited briefly, in an evaluation of the variable.

II. VERBAL CONDITIONALITY

The Interview. It was suggested above that verbal conditionality had trait-like characteristics. The fact does remain, however, that people differ in how conditionally they speak at different times and in different situations. In obtaining an estimate of a person's overall conditionality, it was necessary to choose a situation in which there was variability from person to person, that was presumably representative of that person's conditionality when he was being conditional, and that was empirically feasible.

Spoken rather than written samples were chosen for the study because of two reasons, one theoretical and one practical. It was assumed that spoken verbal behavior is representative of more of a person's cognizing than is written behavior. Speaking occurs at a faster pace than does writing, and it seems plausible that 'thinking' happens at least as rapidly. When writing, a person is not only slowed down by the muscular movements involved, but he has more of a chance to correct his output according to various norms for 'correct' grammar, good writing style, compression of expression, and so on. A more practical reason was that in an examination of about 200 Freshman English themes, written on various topics, only a handful of conditional constructions was found. Presumably norms for writing succinctly had their effect.

After pretesting several situations involving written and spoken behavior of undergraduate students, an inverview was designed that had the following general outline: (1) a few minutes of conversational warm-up; (2) a question about what the subject might do if he had a free Saturday afternoon; and (3) a question about ways of studying. Both questions are about areas that the subjects were familiar with and that were presumed to be relatively free of conflicts. Both questions ask the subject for plans for behavior, in a fairly overt sense of the word, and emphasize alternatives. The Saturday afternoon question is about a hypothetical situation, and the studying question is about a general area of student behavior for which there are in fact alternative approaches, even though some students might not see alternatives. It was found in pilot interviews that subjects responded with varying degrees of conditionality to the questions, appeared to have no trouble of thinking of something to say, and seemed interested in the subject matter.

The verbal responses of the interviewers after tha main questions were to some extent planned, also. For each question, probes of two sorts were specified. First, probes such as "And what else might you do?" were included to induce the subject to push further within his memory structure. Second, probes were included which were intended to 'prime' the subject to speak conditionally by specifying some condition.

After the conversational warming-up period, the interviewer prefaced the questions with the following explanation:

> "In this study we are interested in certain features of a person's verbal behavior--that is, how he speaks and writes. In

this part of the experiment, we want to hear you sit down and talk about some things. Specifically, I'll ask you several questions that are sort of hypothetical and ask you to comment on these at whatever length you care to. We don't want short, concise answers here--mainly we want to hear you talk."

The interview questions followed:

1. "Let's suppose it's a Saturday afternoon about this time of year. You don't have any tests or papers coming up, and no job that you must do. In other words, it's a free Saturday afternoon. What are some of the things you might do in this situation?"

Probe 1: "What are some other things you might do?"

Probe 2: "Anything else?"

Probe 3: "What else might you do?"

Probe 4: "Let's say it's one thirty on this particular Saturday afternoon, and you find yourself with no plans you are committed to for the next few hours. What are some of the things you might take into consideration in deciding to do one or more of the things that you might do?"

Probe 5: "What else might you consider?"

Probe 6: "Are there any other things you would consider?"

2. "Next, I want you to talk about how to study. What are some of the ways of studying--and things like that. (Pause.) Let's suppose that you have a friend who is just entering the University. He's never been to a college before, and as is often the case, the kind of studying he did in high school won't help him much at the University. What are some of the points that you might make about studying to give your friend some insight on how to do

well academically at the University?"

Probe 1: "What are some other things?"

Probe 2: "Are there any other things?"

Probe 3: (Note to interviewer: Probe is optional. Often an S will talk about concentrating, finding a quiet place, etc., and not be more specific. In this case, after he has had his say on concentrating, the steering question is:) "Besides things like getting down to studying, keeping your mind from wandering, and so on--what are some other points? I mean, like techniques of studying once you get down to it."

Probe 4: "Are there any others you would like to tell about?"

Probe 5: (Optional probe. In many cases, the following will already have been covered by the S. If it has not, use probe.) "How about studying for different courses?"

The verbal measures. Above, a brief characterization was given of those verbal forms taken as indicating conditionality. These indicators were subdivided into three main groups: (1) words indicating tentativeness, uncertainty, or a hypothetical mode of thinking; (2) words or phrases indicating branching or alternation; and (3) constructions specifying tests or conditions, particularly conditional adverbial clauses. A fourth category would include explicit references to the processes of testing and choosing which do not have the grammatical form of conditional adverbial clauses.

In coding interviews, these groups were further subdivided. For the first group, the following indicators were identified:

1. Would and could.

2. May and might.

3. Maybe and perhaps.

The second group included the following subdivisions of branching-words:

4. Introductory branch-words, including or or a synonym used before a complete clause.

5. Internal branch-words, including or or a synonym used within a clause, whenever it was not an example of the next category.

6. Indefinite branch-words, including all uses of or followed by an unspecified alternative, e.g., "or something like that."

In the third group, the following indicators were identified:

7. If-clauses: conditional adverbial clauses containing the word "if."

8. Other conditional adverbial clauses.

Because of its similarity, the remaining indicator was regarded as belonging with the conditional clauses:

9. Descriptive conditionals, including such words as "depends on," and "consider."

It can be seen from the above description that most of the categories require only the identification of certain words, or clearly defined classes of words and phrases. Some mild facility in grammar is required to classify an "or" into one of the sub-categories of branch-words; and some judgment must be exercised in identifying descriptive conditionals and some conditional adverbs--but the measures are

straightforward. Evidence will be presented below on how readily they can be judged.

It is also clear that semantic considerations are minimal in identifying the above indicators, and that what semantic considerations are involved are fairly general and 'grammatical.'

Interjudge consistency. In order to illustrate the straightforwardness of the verbal measures chosen for this study, what might be considered an extreme test was made. Ten interviews were chosen randomly from the sample, and transcripts were reproduced and given to undergraduate students in an introductory social psychology course at Syracuse University for judging. The course had as pre-requisite either an introductory psychology or an introductory sociology course, and the year in college of the students ranged from second semester freshman to senior. There is no reason to believe that these judges had previous experience in any kind of grammatical analysis beyond that covered in a freshman English course. The subject matter of this study had not been discussed in class.

Table 1

Average *r*'s among Judges for Syntax Measures

Interviews	Among student judges	Between students & study judges	Number of student judges
A & B	.908	.941	29
C	.862	.948	7
D	.946	.983	3
E	.848	.912	3
F	.815	.780	8
G	.866	.954	3
H	.607	.894	2
I	.955	.964	2

Copies of a description of the measures were given to each student, and the instructor, Dr. Richard Videbeck, gave a ten minute lecture on the measures and how to mark the coding sheets. The students were free to ask any questions except about specific constructions in the interviews they were to judge.

Each student judged three transcripts. Two of the interviews were rated by each student. One of these interviews was from a relatively highly conditional subject, and one from a less conditional one. The remaining interviews were distributed in a presumably unsystematic fashion.

From the 49 student judges, 29 were selected for the analysis. In selecting these 29, several students were screened out who in the instructor's opinion were less likely to be conscientious in their approach to the task, but the selection was otherwise arbitrary.

The judges' assessment of scores for each of the nine verbal measures used in the study were intercorrelated among judges, and between each judge and the author, who coded the interviews for the analyses reported in this dissertation. Thus, a measure of interjudge consistency for inexperienced judges was obtained, as well as a check on the consistency of assessing the verbal measures between naive judges and the author.

Average correlations are given in Table 1. These averages were obtained by computing the _z_' transformation of Pearson's _r_ for each correlation, and applying the inverse transformation to the average _z_'. For the two interviews that all students judged, correlations were done. The judgment vectors were merged in computing _r_'s for the two interviews that all students judged. A varying number of students judged the remaining interviews. One interview was rated by only one judge from the sample; that correlation, which was .887, is omitted from the table. The average intercorrelation among the student judges is quite acceptable, considering their lack of experience. For some reason which is not clear, the correlations between the students and the author were higher than the correlations among students.

Of the 541 individual intercorrelations, about two-thirds were .9 or above, though they went as low as .388. The lower correlations tended to stem from the same judges, across a number of comparisons. However, in the main, the proposition that the verbal measures are easy to code even by undergraduate judges with minimal training, appears to be well demonstrated.

Relations among the measures. Verbal conditionality has been spoken of in the singular, though several kinds of functioning have been mentioned in connection with it--operating in a hypothetical mode, branching or alternation, and testing. The fully conditional person should be facile with all three; however, it is possible to conceive, for instance, of persons who could generate alternatives fluidly but might have difficulty in testing to choose among them.

To gain some notion of the relatedness of the measures, intercorrelations were computed, and a principal components factor analysis was performed. Results of a Varimax rotation of the obtained factors are given in Table 3. The original correlation matrix is given in Table 2.

It is apparent from both the original correlations and from the factors obtained that not all the measures are not exceptionally good predictors of one another and that some dimensioning of conditionality is called for.

There are some interesting patterns in the correlation matrix. The varieties of "or" tend to intercorrelate. "If," and the introductory and internal (but not the indefinite) varieties of "or" are the variables which predict most well to most of the other variables. Indefinite "or" is associated with the other two varieties, but not appreciably with the other measures; and descriptive conditionals are fairly strongly associated with if-clauses and hardly at all associated with the other measures.

Table 2

Correlations (Pearson r) among the 9 Basic Verbal Measures
Corrected for Total Output

	1	2	3	4	5	6	7	8	9
1. Would, could		.107	.281*	.221*	.371*	.057	.469*	.043	.122
2. Might, may			.194*	.365*	.124	-.046	.153	-.026	.001
3. Maybe, perhaps				.452*	.420*	.162	.108	.162	.128
4. Introductory or					.496*	.299*	.205	.087	.017
5. Internal or						.374*	.277*	.098	.125
6. Indefinite or							.049	.133	.009
7. If-clause								-.013	.420*
8. Other cond. adv. clauses									-.032
9. Descriptive conditionals									

*Significantly different from zero at .05 level or beyond.

2-tailed tests

Table 3

Varimax Rotation of Factors Obtained in Principal Components Analysis of Adjusted Verbal Measures

	Rotated Factors				
Measure	A	B	C	D	h^2
1	.084	.006	.072	.051	.015
2	-.149	.025	.878	-.084	.801
3	.368	.071	.495	.424	.490
4	.521	-.015	.655	.045	.703
5	.677	.060	.245	.057	.525
6	.866	.019	-.095	.035	.761
7	.031	.563	.103	-.072	.334
8	.049	-.016	-.010	.967	.938
9	.040	.956	.003	.009	.916

In the unrotated factor matrix (not reported) a general factor appeared followed by several group factors. In the Varimax rotation, the general factor disappeared, which is not surprising considering the nature of the kind of rotation (Fruchter and Jennings, 1962, p. 254).

Instead, several group factors appear. Factor A loads most heavily on the three "or" measures. Factor B loads most heavily on if-clauses and descriptive conditionals. Factor C loads heavily on "might" and "maybe" words, and for some reason which is not clear, on introductory "or's." The fourth factor loads most heavily on conditional adverbial clauses other than those involving "if."

These factors are similar to the theoretical grouping of the measures. Factor A involves alternation; Factor B indicates testing and consideration of contingencies; and Factor C is something of a hypothetical modality factor. Some of the loadings, however, are not perfectly consistent with the pre-analysis division of measures. The modals "would" and "could" do not load appreciably on any of the factors. The occurrence of conditional adverbs other than "if" does not appear to be related to much of anything else, verbally. This is curious, in view of the syntactic similarity of words such as "whenever" and "if."

Aggregated verbal measures. An implication of the correlational analysis is that verbal conditionality is sufficiently differentiated in the sample that an analysis of the various dimensions of conditionality in comparison with the dependent variables is called for. However, the measures do not appear to be distinct enough to preclude the investigation of some measure of overall conditionality.

For purposes of the experiments reported later, four aggregated verbal measures were constructed; and a total verbal conditionality score was also derived for each subject. The four aggregated measures were:

1. If-score. The sum of if-clauses and descriptive conditionals, corrected for total words.
2. Or-score. The sum of the three adjusted "or" measures.
3. Might-score. The sum of "might," "may," "maybe," and "perhaps," adjusted for total words.
4. Other conditionals. The sum of "would," "could," and conditional adverbs other than "if," adjusted for total output.

In addition, an index of overall conditionality was constructed by summing the 9 adjusted syntax measures for each subject.

The four aggregated measures are generally in line with the results of the rotated factor analysis. The "might-score" does not reflect the heavy loading of introductory "or" on Factor C; and the fourth score, "other conditionals," is something of a residual category; but the other two sums are direct reflections of the heaviest loadings in the first two factors.

Conditionality and verbal intelligence. Since conditionality is conceived generally as a kind of facility in information processing, one may ask if what we are really dealing with here is simply "intelligence." The position taken here is that, loosely speaking, conditionality would qualify as one kind of intelligence, but--if it turns out to be a fruitful variable--a kind of intelligence that is theoretically specifiable with more precision than the usual variety of "intelligence."

To check on the association between conditionality and intelligence, two tests slanted toward what might be called "verbal intelligence" were chosen. The tests were The Ohio State Psychological test, and the Verbal section of the college level Cooperative School and College Abilities Test (SCAT). Both tests might more accurately be described as tests of academic aptitude, but so far as available tests, they were assumed to provide a reasonable estimate of verbal intelligence in general. It was thought that verbal intelligence of one sort or another would be more relevant to verbal conditionality than would facility in numerical manipulation or memory for digits, for instance.

Scores on the tests were kindly furnished by the University of Missouri Testing and Counselling Service. The Ohio Psychological had in most cases been administered to subjects during their senior year in high school, and the SCAT Verbal had been administered in connection with Freshman Placement Testing.

For those subjects for whom the tests were available, verbal intelligence was not found to be appreciably correlated with verbal conditionality. For the 9 individual measures of conditionality, only one correlation--adjusted use of "would" and "could" versus the SCAT--produced results which were found to be significantly different from zero ($r = .249$, $p < .05$, two-tailed test). The only other correlation that looked as if it might have been significant with a large sample was that between indefinite alternation adjusted for output and the Ohio Psychological (.219). Other correlations were quite small, and were both positive and negative.

Correlations between the two tests and the aggregated verbal measures used for most of the dependent variable analysis were also computed. None of the correlations were significantly different from zero.

Because of the above findings, no attempt was made in the data analysis to control for verbal intelligence, and it may be concluded that the association between verbal conditionality and the kind of verbal intelligence involved in the two tests is negligible.

III. RIGIDITY AND CONCEPT ACQUISITION

Rigidity in concept acquisition. When it was suggested that verbal conditionality might have something to do with "flexibility" of cognitive functioning, the term was used in a general sense. No identity was implied with "flexibility" as it has been discussed and measured by any particular psychologist (see, for example, Cattell and Tiner, 1951; Luchins and Luchins, 1959; Kounin, 1941; Lewin, 1935; Merrifield, et al., 1962). However, the work on "flexibility" and its more often emphasized contrast term, "rigidity," together with similar concepts, provided a considerable amount of the motivation for investigating conditionality, and the question of the empirical similarity among the variables is an interesting one.

In the literature, "rigidity" usually refers to perseverating in a previously successful approach to a problem when actual conditions make this approach unfruitful. The classical term for this kind of rigidity is the Einstellung effect, and its classical measurement is Luchins' water jar problems (Luchins and Luchins, 1959). Another sort of Einstellung measurement, of more interest here, is concept formation tasks. Several standardized tests have been used, among them the Wisconsin Card Sorting Test (Wesley, 1953) and the Vygotsky Concept Formation Test (Hanfmann and Kansanin, 1937). In these tests, the subject is confronted with a set of multi-attribute objects and his job is to classify them according to some rule, which is not stated. After he places one of the objects into one set or another, he is reinforced. After he has successfully classified a number of objects, the experimenter changes the rule determining the reinforcement. The time or number of trials until the subject changes his responses to the requirements of the new rule is taken as the measure of rigidity.

The adaptation of concept formation tasks to an Einstellung measuring procedure suggests one way of exploring the possible correlates of conditionality. The unannounced shift of rules, together with the trial-after-trial nature of the task, allows a convenient way of measuring that kind of rigidity which involves perseveration in a previously successful response when it is no longer successful. Furthermore, the structure of concept acquisition tasks recommends them for investigation. The tasks are fairly well-defined, lend themselves to precise variation and experimental manipulation and have a degree of complexity that is reminiscent of that of 'real life' problems confronting humans as complex information processors.

If verbal conditionality were found to be related to speed of adapting to a shift of classification rules, a link between the former variable and classical work on 'rigidity' would be indicated.

Hypothesis 1. Less conditional subjects will take a greater number of trials to criterion after a non-reversal shift in a concept acquisition problem than will more conditional subjects.

Skill in attaining concepts. Apart from its adaptation for assessing a variety of classical rigidity, the concept attainment paradigm is interesting in itself for what light it might cast on conditionality. That concept acquisition is amenable to analysis in terms of information processing strategies is of considerable interest in connection with the presumed importance of conditionality in human information processing.

The analysis of concept acquisition in an information processing framework comes from two main sources--first, the rather minute experimental analysis of strategies of concept attainment by Bruner and his colleagues (Bruner, Goodnow, and Austin, 1956); and the work of Hovland and Hunt (1960) with both people and computers (see also Hunt, 1962; and Hunt, Marin, and Stone, 1966). In the information handling approach, a person in a concept acquisition task is viewed as actively making and checking hypotheses about the unknown rule of classification, rather than passively building up stimulus-response bonds. In the course of producing hypotheses, testing hypotheses, and acting on the results of these tests, formalisms such as branch-on-test routines are natural for conceptualizing what is going on. In fact, Hovland and Hunt have written programs in both machine and list processing languages that imitate somewhat idealized strategies identified experimentally in people by Bruner and his colleagues.

What Bruner calls an hypothesis is in our terminology a test. Trying out a succession of hypotheses can be viewed as a series of events describable as performing a test, branching to a new test, performing the test, branching the new test, and so on. In the kind of concept attainment problems investigated in the laboratory, where the number of relevant attributes and values is finite and small, the tests themselves may be conceived as also having a branching structure. In the work associated with Hunt, the tests are formalized as decision trees, with tests for values of attributes at the nodes.

Since branching, in a number of guises, seems to be a central issue in concept acquisition, if verbal conditionality indicates generally facility in branching, then individual differences in concept acquisition proficiency should be predicted by conditionality measures. Further, a predisposition towards 'tentative' functioning, as indicated by verbal measures, should facilitate the whole business of hypothesis testing; and insofar as conditionality is relevant to alternative generation, the construction and testing of alternative hypotheses should be related.

Hypothesis 2. Highly conditional subjects will reach criterion in fewer trials on concept acquisition tasks than will less conditional subjects.

Procedure Cards for the problem had figures in the upper right-hand quadrant and one green equilateral triangle in the lower left-hand corner. The figures in the upper quadrant were approximately .75 inches across, and the green triangle was approximately .5 inches high. The figures in the upper corner were centered in that quadrant. The upper figures differed along the following attributes:

1. Number: one or two.
2. Color: red or green.
3. Shape: plus or horizontal bar.

An additional attribute was associated with the green triangle:

4. Position: 'pointing' up, down, left, or right.

The deck contained all combinations of the values of the four attributes, giving a total of 32 cards.

Cards were presented in essentially random order, with the restriction that the first card in the deck was a positive exemplar of each concept to be attained with the deck. Cards were shuffled for each subject, cut, and shuffled again.

The identifying rule to be learned in the straight concept acquisition problem was "at least one plus appears." The concept to be learned after the shift was "a red figure appears." Each rule has three irrelevant attributes.

To introduce the task, the experimenter said:

> "In this part of the experiment, I'm going to show you some cards, one at a time, and your task is to tell me which of these cards 'belong together.'"

He then showed the subject the stack of cards, enumerated the attributes and values of the attributes, and pointed out examples of each on cards in the deck. He continued:

> "On these cards, different patterns occur. We can describe these patterns in terms of the five things I pointed out: number, color, and shape of the figures in the upper right; and the direction

that the triangle in the lower left is pointing. Some of the patterns have certain features in common, but none of them is exactly like any other one.

"There is a certain group of these patterns that I am thinking about--that is, a certain group of cards in this deck. Each of the cards in this special group has one characteristic in common with all the rest of the cards in the special group.

"I'm going to show you the cards one at a time, and your job is to identify the ones that are in the special group that I am thinking about. In other words, you will have to figure out how to identify members of this group. The way we will do it is this: I will show you a card and you will say 'Yes,' or 'No,' depending on whether or not you think it is a member of the group. Then I will tell you if you are correct or incorrect."

The experimenter then pointed to the top card of the deck, and continued:

"For instance, suppose you think that this card is a member of the special group--because you guess that it has the characteristic that all of the cards I am thinking about have. You would say 'Yes.' Then, I would say 'Correct,' because this card is one of the right ones."

The subject was asked if he had any questions. If so, the experimenter explained by repeating or paraphrasing parts of the instructions, then continued:

"All right, let's go through them now. Only those things that I pointed out on the cards are important. For instance, if some figure is a little crooked or there is dust on some of the cards, that is not the sort of thing we're looking for. Also, try not to make the problem too complicated. The characteristic is a very simple one."

The above instructions were designed to emphasize the information processing aspects of the task.

After the instructions, E showed S the cards, one at a time, with an interval of about eight seconds per card.

S's success or failure on each trial was recorded on a score sheet, which was concealed from S.

A criterion of 15 consecutively correct responses was used for judging S to have acquired each concept.

A maximum of 128 trials, or four complete runs through the deck, was given for the first concept to be attained. On the shift concept, the maximum number of trials given was four complete runs through the deck, plus whatever remained of the run on which the subject attained the first concept. For purposes of data analysis, the maximum number of trials actually counted for a subject who failed to attain the shift concept was 128. No subject who attained the shift concept required this many trials, although one subject attained the concept on the 126th trial.

Results: Rigidity hypothesis. It was predicted by Hypothesis 1 that more conditional subjects would attain a simple non-reversal shift concept in fewer trials than would less conditional ones. Of the 49 qualifying for the shift by virtue of successful acquisition of the earlier concept, 8 failed to attain the shift in the maximum of 128 trials. Besides this accumulation at trial number 128, the distribution was slightly skewed towards the lower end.

Spearman rank order correlations, or *rho's*, between trials to criterion and the main verbal measures are listed in Table 4. If-words predicted reasonably well to number of trials needed to attain the shift concept, and except for or-words, or alternators, the association of the remaining conditionality measures with success on the shift was in the predicted direction, though not statistically reliable.

Hypothesis 1 can be regarded as supported for the variety of conditionality assessed by if-words or contingents, although not a large proportion of the variance is accounted for.

Results: Concept acquisition skill. It was predicted in Hypothesis 2 that more conditional subjects would attain concepts more

Table 4

Rho's with Correction for Tied Ranks between Verbal Measures and Trials to Concept Acquisition After a Non-reversal Shift

Conditionality Measure	rho	p
If-Score	-.394	.005
Or-Score	.052	-
Might-Score	-.106	-
Others	-.109	-
Overall	-.224	-
		n = 49

Note: Significance levels are for a one-tailed t-test for the significance of rho (Siegel, 1956, p. 212).

readily than less conditional ones, apart from their ability to shift from one concept to another when the experimenter changed the rules. This hypothesis was tested with a simple one-attribute concept and a more complex disjunctive concept.

Spearman rho's with correction for tied ranks are given in Table 5 for association between trials to criterion on the first concept acquisition problem and the verbal conditionality measures. For all subjects, the rho's are in the predicted direction except for might-scores. The association with alternation or or-scores is statistically significant, though not much of the rank variance is accounted for.

Sixteen of the 65 subjects taking the first one-attribute concept problem failed to attain the concept within the 192 trials set as a maximum. The distribution of trials-to-attainment for this problem is interesting. It is skewed towards minimum trials; and all but four of the 49 subjects who passed did so within 55 trials. All but 11 acquired

Table 5

Rho's with Correction for Tied Ranks between Verbal Measures and Trials to Criterion on One-Attribute Concept Acquisition

	All S's			Passers Only		
	rho	n	p	rho	n	p
If-Scores	-.066	65	-	-.223	49	-
Or-Scores	-.244	65	.05	-.241	49	.05
Might-Scores	.141	65	-	.080	49	-
Other	-.041	65	-	-.147	49	-
Overall	-.124	65	-	-.284	49	.05

Note: Significance levels are for a one-tailed test.

the concept within 40 trials. In other words, subjects either acquired the concept very readily or did not attain it at all readily.

The bimodality is so extreme it would appear that the subjects are from two populations, one of passers and the other of failers on one-attribute concept problems. A check showed that no concentration of failers or passers with particular experimenters existed; and the original scoring sheets were rechecked in case a clerical error had been made.

Chi-squares partitioned according to a median split on the verbal measures against passing and failing were calculated. The comparison for or-scores was statistically reliable (see Figure 1), but for the other syntax variables, the proportion of failers was about evenly divided among those above the median and below the median on the measures.

Figure 1

Chi-square for Median Split on Or-Scores Against Success at First Concept Problem

	Or-Score Above Median	Below Median	
Pass	29	20	49
Fail	4	12	16
	33	32	65

$\chi^2 = 4.354$, df = 1

$p\ .05$

Rho's are also reported in Table 5 for those subjects who passed the problem. The significance figures quoted are not proper, strictly speaking, since the subjects were not independently sampled into a passing group, but are included for reference. The correlations are somewhat higher for all measures except might-words, and especially so for overall verbal conditionality.

Interpretation. Both hypotheses under consideration received some support, though different results were found for different varieties of verbal conditionality, and not much of the variance was accounted for.

That if-scores, or emission of constructions indicating testing functions, was fairly well related to facility in attaining a concept after a non-reversal shift is interesting in the light of the similarity of the notions of Einstellung and tests-to-exit.

For the first straight concept learning problem, prior to the shift, the hypothesis that skill in acquiring classification rules would be related to verbal conditionality also received support, though again the support was different for different measures, and not much of the variance was accounted for.

If we consider the correlations involving only those subjects who passed the first problem, an interpretation of the results for such problems is suggested. It would appear that conditionality functions involving both testing and alternation are important for such tasks, but that mere predisposition to function in a hypothetical mode, as evidenced by use of "might" and other modals, is not enough. Alternation appears to be more important than contingency testing. The failers were characterized as less likely to emit "or" constructions than passers, and what distinguishes the two groups may to some extent be differences in their Plans for generating new hypotheses and other branching functions, rather than the strict testing routines. But for successful concept attainment of this sort, both alternation and testing would appear to be helpful.

The fact that only those subjects who passed the first problem were administered the shift procedure raises a question about the similarity of straight concept acquisition skill and readiness to respond to a shift in feedback. The effect of the design was to filter out those subjects from the shift experiment who appeared to be in a distinct group of concept problem failers. No doubt this reduced the average number of trials to completion for the shift problem. However, concept acquisition skill *per se*, and success after the shift do not appear to involve the same sorts of functioning in equal proportions. The rho between trials to success on the first problem and on the shift is -.119, which is not significantly different from zero. Furthermore, contingency testing appeared to be crucial for responding successfully to the Einstellung procedure, whereas both testing and alternation seem to be required for the first problem, with an emphasis on alternation.

IV. DISCUSSION

It seems clear from the results reported for the two kinds of concept acquisition problems that verbal conditionality does have relevance for human information processing. Although not a large proportion of the variance was accounted for, yet results are consistent with the predictions, and the predictions are not obvious ones. On the face of it, there would appear to be no reason why the number of times a person says "if" when talking about what he would do on a free Saturday afternoon should have anything to do with how quickly he changes an inappropriate response in categorizing circles and squares on three by five cards shown to him by an experimenter.

Another conclusion that is clear both from the analysis of verbal measures ~~per~~ se, and in relation to concept acquisition, is that the notion of conditionality is not unitary. There are different kinds of functioning involved, and individual differences are meaningful for these more finely divided kinds of functioning. Though evidence is certainly incomplete at this point, the use of contingent words seems closely related to performance in tasks involving testing for feedback; whereas use of alternators seems most closely related to performance in tasks in which the crucial ability is that of generating alternative hypotheses. But since in actual information processing activity, the two sorts of functioning would appear to be highly interspersed with one another, it is difficult to sort out just what is going on when. It may be that further distinctions will be necessary in further work in the area, and that, for instance, kinds of testing, or kinds of alternation that are psychologically meaningful and easily measured will turn up.

Additional confidence is generated in the variable by its producing results in several situations. In the results reported above, straight concept attainment and responding appropriately to a nonreversal shift are two different kinds of procedures, though both take place in the same general experimental setup. Additional results are reported in Hays (1966), which contribute to the tissue of empirical meaning of the concept. Briefly, it was found that verbal conditionality in one or more of its varieties predicts to rating-scale style, to a measure of cognitive differentiation and integration, and to intensity and persistence of attitude change.

A number of Semantic Differentials were administered to undergraduates for social position concepts (e.g., President Johnson, Elementary School Teacher, Male High School Social Studies Teacher). It was found that subjects higher in conditionality tended to use more scale-points in the 7-point scales involved in the Semantic Differentials, apparently reflecting a more finely dimensioned handling of the concepts and their attributes--internally or in communicating with the experimenter, or both. In addition, it was found that more highly conditional subjects tended to view apparently similar concepts and also apparently distinct concepts as both the same and as different across a number of attributes, whereas the less conditional subjects tended to rate these social position concepts as either the same or else as different. The less conditional subjects thus exhibited 'all-or-none' thinking.

Another study reported in Hays (1966) involved an attitude change paradigm. Students wrote essays contrary to their previously assessed attitude on a subject, and were retested twice on the attitude scale, once immediately following the essay, and then two weeks later. It was found that the more conditional subjects changed their measured attitude in the direction of their discrepant position taken in the essay more than did the less conditional subjects on the first retest. It appeared that they could more easily see an issue in a different light (or else could be more compliant to what they considered as the wishes of the experimenter), whereas the less conditional subjects could not. However, when retested after two weeks, the more conditional subjects had largely returned to their original position, but even then were more affected by the experience of having examined a point of view that they had not

originally held.

The model for this attitude change study was an experiment by Harvey (1964), in which the variable under consideration was cognitive abstractness, one in which considerable work has been done, by both Harvey and his colleagues Hunt and Schroder. Results for conditionality were strikingly similar, for comparable experimental conditions, suggesting that verbal conditionality may be related to the earlier concept.

The general implication of the above is that verbal conditionality, with the qualification that it appears to require further clarification into component functioning, is a meaningful area of investigation for cognitive phenomena.

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CHAPTER IV

SUCCESS, FAILURE, JUDGED COMPETENCE AND CHOICE

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The goal of this exploratory study is two-fold. First, an attempt was made to determine how S's judged competence to perform a given task would be related to his tendency to choose to perform that task. In Chapter V a study is reported in which S's showed a distinct tendency to persist at a task when SUCCESS was in the moderate range. However, these Ss were performing under conditions which could only be described as "relaxed." They performed the task in their own dormitory room, without coercion and the task was presented as one in which the outcome was relatively unimportant. One might conclude on the basis of these results that under such "relaxed conditions" there is a tendency for Ss to prefer tasks at which they are moderately competent. In the present study Ss' choice were observed under definitely less relaxed conditions. Participation in the experiment was part of a class requirement and the task was described as a "test of their competence to recognize the symptoms of mental illness and/or health in others." The question to be answered first of all in this study then is: Will Ss under these more restrained, success-oriented and possibly anxiety arousing conditions likewise exhibit a kind of riskiness in their behavior? That is, will Ss show preferences for tasks on which there is only a moderate possibility of success or will they choose to perform on tasks where SUCCESS is most probable. On the basis of the theory presented in

Chapter V it would be predicted that if conditions were in fact restrained Ss should choose the tasks with the highest probability of success.

The second major goal of the study was to explore how judged competence at a task varies in relationship to certain selected success-failure experiences. Two possibilities were considered. First, changes in judged competence were viewed as a direct function of amount or ratio of success received at any given task. Therefore, the relationship between the total amount of success received and changes in judged competence were determined. However, Ss received success under systematically varied circumstances. After a standard amount of trials with controlled success Ss then performed on a task under conditions of choice or compliance. Furthermore, the task on which they performed had been differentially productive of success initially and thus differential expectation of success presumably existed. On this second part, then, the standard amount of success would confirm expectancies to a varying degree. Presumably, then, besides determining the effects of amount of success on judged competence change, it can also be determined whether such cognitive variables as expectancy-confirmation and freedom of choice modulate the relationship between reinforcement-success and judged competence change.

METHOD

Subjects

Members of an undergraduate sociology class served as subjects. Participation was part of the class requirement and was presented to Ss as an attempt to give first-hand experience with testing procedures and methods.

Measurement Instruments

A measure of "judged competence" was designed to meet the specific needs of the study. Since the competence to be manipulated dealt with the "recognition of mental illness," this test required subjects to rate themselves on a seven-point bipolar scale on a selection of activities related to recognizing mental illness. Nine of the activities (items) were directly and specifically related in content to the experimental task; the remaining seventeen activities (items) were less directly related. Thus, an analysis of "spread of effect" is rendered possible by one design of the scale. Items in this judged competence test were selected from a larger pool of items. Selection was made on the basis or relevance to the experimental tasks. In addition to the competence scale several questionnaires related to assessing S's interests in the task were also developed.

The judged competence test was administered to subjects in one of their regular class sessions several weeks previous to the experiment proper. This test was administered in connection with several other tests and questionnaires under the ruse of informing subjects about the nature of attitude and opinion scales. At the time of the administration of this pretest no mention was made of participating in an experiment related to this particular testing.

Experimental Procedure

As already indicated the experimental task was one of presumably recognizing mental illness on the basis of responses to standard psychological tests. Subjects were informed that E had developed a test (experimental task) which had been found to be effective in identifying persons who "were potentially good diagnosticians." The subject was further informed that E was now interested in using this test to find out how well laymen (the subjects) were at recognizing the symptoms of mental illness. It was emphasized to Ss that mental illness is a disease which must be recognized early if cure is to be effected and in most cases laymen would have to make the first diagnosis. It was noted that there was no information available on how effectively laymen could recognize mental illness and therefore the raison d'etre of the present study.

The experimental task itself was comprised of three parts. In the first part S was administered "Form A of the Mental Illness Diagnosis Test." Briefly put, the "Test" consisted of considering the responses of "patients" and "Normals" to a Rorschack card, a TAT picture, a self-rating scale on the order of the semantic differential, and a house-tree-person drawing task. In taking this test subjects viewed the response listed in their booklet, decided whether a normal or disturbed person made the response, recorded their answer on the answer sheet and then reported their answer to E. The experimenter then obliged by "checking the response against the master answer sheet" and informed S of the correctness of his response. Actually, E's response to S was predetermined and not contingent on S's answer. Each S received 90% correct responses on one of the tasks, 70%, 50% and 10% correct responses on the other tasks. This "reinforcement pattern" was systematically varied from subject to subject. That is, although all Ss received all four of the reinforcement contingencies, the precise task on which a given reinforcement contingency was administered was systematically varied over Ss. It should be noted that each of the four tasks involved 15 trials and the actual pattern of reinforcement was preprogrammed for each reinforcement contingency. Following the completion of "Form A of the Mental Illness Diagnosis Test" S was asked to participate in an intermediary activity in order to "break the routine." This intermediary activity was described as a pilot study in a psycholinguistics project. In this intermediary task S was presented with a series of African words and a parallel list of English words. For each pair S was to decide whether the English word was a reasonable equivalent of the African word. The experimenter emphasized that the task was of little consequence and gave S no feedback regarding the correctness of his response. After responding to 20 such pairs, S was allowed to return to "Form B of the Mental Illness Diagnosis Test." Basically the tasks on Form B were similar to those on Form A. However, each task contained five rather than fifteen items. Previous to performing in Test B subjects were given a choice of the items on which they wished to work. It was explained to them that there may not be sufficient time to work with all of the test items. Therefore, knowing their preference E would make some attempt to allow them to work with tasks that interested them most. One-half of the Ss were allowed to work on their first choice and one-half of the Ss were automatically assigned their last choice. All Ss received four correct responses on four of the five tasks. In other words, on "Form B of the Mental Diagnosis Test" all Ss experienced a generally successful performance regardless of the tasks on which they performed.

Following the administration of Form B, S (1) was asked to rate the interest value of each task (2) state his rank preference for the tasks if he were asked to perform them again (3) and given a chance to volunteer for future work with the experimental tasks. Following this, S was dismissed and the experiment proper was concluded. One week later in a regularly scheduled class period S again took the judged competence test in connection with several other tests. Finally, a complete discussion of the rationale and purpose of the study was conducted for all Ss.

It should be noted that the E who administered the competence tests did not participate in the experiment proper and every attempt was made to distinguish the pre- and post-experiment judged competence tests from the experimental situation.

RESULTS

Success, Failure and Choice

When Ss were asked to do one of the tasks again they showed an overall tendency to choose tasks on which they had received the greatest amount of success. This is seen in Table 1 where the mean rank related to the amount of reinforcement previously administered is presented. The distribution of first choices according to reinforcement contingency is found in Table 2. It may also be noted that a more detailed analysis revealed that this basic pattern obtained regardless of the specific task involved and regardless of the sex of the subject.

TABLE 1

CHOICE OF TASKS RELATED TO RATIO OF SUCCESS RECEIVED

Ratio of Success During First Trial with Task:	Rank-Choice $\overline{X}$	S.D.	N
.90	1.7838	0.9690	74
.70	2.0000	0.8601	74
.50	2.8378	0.8763	74
.10	3.3467	1.0066	74

TABLE 2

DISTRIBUTION OF CHOICES ACCORDING TO REINFORCEMENT RECEIVED

Ratio of Success Received	Rank 1	Rank 2	Rank 3	Rank 4
.90	38	20	10	6
.70	22	35	12	5
.50	7	14	37	16
.10	7	5	15	47

However, the question that subsequently arises is, does this same general relationship obtain at the final statement of choice and preference. Following the initial statement of choice several possibly important experiences were had by S. (1) First, he either was or was not granted his choice in performing on one of the tasks a second time. (2) He performed on a task on which he had initially received varying degree of success and for which now he would conceivably have a variable expectation of success. (3) Finally, more reinforcement was administered and some Ss at least could be somewhat sated with success. In other words, there may in fact be a curvilinear relationship between success and choice--if a sufficient amount of success is administered. Preliminary data pertinent to this line of questioning are presented in Tables 3, 4, 5, 6, and 7.

Considering the last question first, Tables 3 and 4 present a frequency distribution of task interest scores relative to the total absolute amount of success received on that task. Tables 5 and 6 contain a frequency distribution of the rank-preferences of tasks in a hypothetical choice situation relative to amount of success received. Tables 7 and 8 contain the distribution of cases volunteering for future work on the given tasks related to the total amount of success received on these tasks and the initially administered reinforcement schedule.

TABLE 3

FREQUENCY TABLE OF EVALUATION LEVEL CHECKED FOR A TASK IN RELATIONSHIP TO AMOUNT OF SUCCESS RECEIVED

(Ss performing on task of their choice)

TOTAL NUMBER OF SUCCESSES RECEIVED	1	2	3	4	5	6	7
17	2	0	0	1	0	8	5
16							
15							
14	0	0	0	1	0	6	7
13	0	0	0	1	1	11	10
12							
11	1	0	0	0	1	2	1
10	0	2	1	1	2	10	9
9							
8							
7	1	1	0	3	12	15	2
6	0	0	0	1	0	2	1
5							
4							
3							
2	1	4	1	3	9	13	4
1							

- EVALUATION LEVEL CHECKED +

TABLE 4

FREQUENCY TABLE OF EVALUATION LEVEL CHECKED FOR A TASK IN RELATIONSHIP TO AMOUNT OF SUCCESS RECEIVED

(Ss performing on task not of their choice)

TOTAL NUMBER OF SUCCESSES RECEIVED	1	2	3	4	5	6	7
17	0	0	0	0	2	0	1
16							
15							
14	0	0	0	0	2	1	0
13	0	1	0	0	3	11	16
12							
11	0	1	0	0	2	3	0
10	1	0	2	1	5	14	8
9							
8							
7	1	3	0	3	8	9	4
6	0	4	1	3	8	4	2
5							
4							
3							
2	2	1	1	0	2	5	1
1							

- EVALUATION LEVEL CHECKED +

TABLE 5

FREQUENCY TABLE OF FINAL RANK-PREFERENCES FOR TASKS RELATIVE TO THE AMOUNT OF SUCCESSES RECEIVED

(Ss performing on task of their choice)

TOTAL NUMBER OF SUCCESSES	RANK-PREFERENCES 1	2	3	4
17	13	2	1	0
16				
15				
14	9	4	0	1
13	5	11	4	3
12				
11	2	0	2	1
10	5	14	3	3
9				
8				
7	2	4	20	8
6	2	1	1	0
5				
4				
3				
2	0	3	8	23
1				

(1 = a first choice, 2 = a second choice, etc.)

TABLE 6

FREQUENCY TABLE OF FINAL RANK-PREFERENCES FOR TASKS RELATIVE TO THE AMOUNT OF SUCCESS RECEIVED

(Ss performing on task not of their choice)

TOTAL NUMBER OF SUCCESSES	1	2	3	4
17	0	0	0	3
16				
15				
14	0	1	1	1
13	22	6	2	1
12				
11	0	0	2	4
10	7	16	8	0
9				
8				
7	1	7	17	3
6	1	1	2	8
5				
4				
3				
2	3	3	2	4
1				

RANK-PREFERENCES

(1 = a first choice, 2 = a second choice, etc.)

In general, it may be concluded that evaluation of and preferences for the tasks appear to increase as the amount of success received increases. Also, it appears that the choice factor is of minimal importance.

TABLE 7

FREQUENCY OF VOLUNTERRING FOR A FUTURE TASK

(Subjects performing on a task of their choice)

ABSOLUTE NUMBER OF SUCCESS RECEIVED ON THE TASK	.9	.7	.5*	.1
17	4	0	0	0
16				
15				
14	0	7	0	0
13	6	0	0	0
12				
11				
10	0	3	0	0
9				
8				
7	0	0	4	0
6	0	0	0	1
5				
4				
3				
2	0	0	0	6
1				

SUCCESS RATIO INITIALLY RECEIVED ON TASK

TABLE 8

FREQUENCY OF VOLUNTEERING FOR A TASK

(Subjects performing on a task not of their choice)

ABSOLUTE NUMBER OF SUCCESS RECEIVED ON THE TASK	.9	.7	.5	.1
17				
16				
15				
14	0	1	0	0
13	12	0	0	0
12				
11	0	0	1	0
10	0	6	0	0
9				
8				
7	0	0	4	0
6	0	0	0	6
5				
4				
3				
2	0	0	0	1
1				

SUCCESS RATED INITIALLY RECEIVED ON TASK

Presumed Expectancy, Choice, and Change in Judged Competence.

It might be predicted that judged competence would be differentially effective depending on certain aspects of Ss' second performance on one of the experimental tasks. That is, there is some basis for assuming that judged competence should change differentially dependent on what task S would perform in part B of the experiment and whether or not it was his choice to perform on this task a second time. Thus when the experiment is considered as a whole Ss had equal amounts of success. However, the conditions under which this success was administered were systematically varied. The question is, do these different patterns bring about different amounts of change in judged competence? The answer to this question can be derived from Table 9, where the results of the analysis of variance of changes on each Competence Scale is presented. The main effects in each case are Choice (Performed on Most Preferred Task in Part B) vs. Non-Choice (Performed on Most Preferred Task) and initial Reinforcement Schedule of the Task (.9, .7, .5, .1). The scores are the respective differences in Pre- or Postest Competence ratings.

From Table 9 it can be seen that performance on a task of differential probable success (as inferred from the actual success under Part A of the experiment) has no observable effect on S's judged competence changes.

TABLE 9

ANALYSIS OF VARIANCE OF CHANGES ON COMPETENCE SCALES

	df	MS	F	p
Total Competence Score				
Choice vs. nonchoice (A)	1	299.0815	1.17	N.S.
Reinforcement-success ratio (B)	3	69.8442	<1.00	N.S.
A x B	3	257.3751	1.01	N.S.
General Competence Score				
Choice vs. nonchoice (A)	1	93.5879	1.00	N.S.
Reinforcement-success ratio (B)	3	34.9010	1.00	N.S.
A x B	3	118.3170	1.00	N.S.
Specific Competence Score				
Choice vs. nonchoice (A)	1	58.0626	1.06	N.S.
Reinforcement-success ratio (B)	3	8.6256	1.00	N.S.
A x B	3	28.5244	1.00	N.S.

CONCLUSIONS

The results suggest the existence of a linear relationship between amount of reinforcement (or success) with a task and the tendency to re-choose that task. This finding in itself adds nothing to common sense notions of behavior. However, as this finding is compared and contrasted with results of the study reported in Chapter V an interesting picture does begin to emerge. Individuals seemingly do prefer the alternative which has been most rewarded in the past and which probably also promises the greatest amount of future reward -- under what we have termed "restrained conditions." Judging from Chapter V the situation appears to change when pressure for success is removed from S. This finding is in line with the theoretical position presented in Chapter V.

The results related to changes in judged competence are not particularly revealing. That neither the choice-compliance factor nor the expectancy factor appear to effect differential change in judged competence runs counter to what might be expected. However, this isolated finding does not merit a great deal of interest. The judged competence test quite conceivably was too insensitive to measure any such differential if it should exist.

In sum, this particular experiment has at least provided an interesting contrast to the study reported in Chapter V. It reveals little about the effects of varied performance situations in effecting changes in judged competence.

CHAPTER V

MOTIVATIONAL ORIENTATION, RISK-TAKING AND PERSISTENCE

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This paper reports an experimental investigation of the relation between risk-taking and task persistence. In the early section of the paper, two hypotheses are tested which are based on an examination of the contrasting but complimentary effects of two motivational orientations. In the final section the construct validity of a risk-taking measure is reported.

HYPOTHESES

Tension-reduction conceptions of motivation have long dominated psychological theories. In recent years, however, some alternative motivational concepts have appeared. White's notion of "competence" and Berlyne's notions of "curiosity" and "novelty" are cases in point. The major difference between the tension-reduction conception and the alternative conception lies in what is considered arousing. Within the tension-reduction scheme the organism is viewed as motivated toward a fixed end-state, expressed as need gratification or drive-reduction in the organism or as goal-attainment in the environment. White's and Berlyne's views of arousing states in the organism are not wholly consistent, but they do share one assumption, namely: intra- and extra-organismic change is potentially arousing. Individuals do seek disruption of the constancy and certainty of fixed end-states.

The two views of motivation do not necessarily lead to competing theories of motivation. Rather, they largely complement one another. Helson observes, "although recognizing such concepts as homeostasis, striving toward equilibrium, desire for rest, and other more or less steady states, we must not forget that individuals and groups strive for variety, change and novelty as well as rest, quiet and the familiar." (1964). Helson argues that while mechanisms (do) exist for maintaining and restoring fixed values associated with actual vital processes, the equilibrium associated with these fixed levels are dynamic. (1964).

The organism, thus, must be viewed as being aroused by an overriding motive; namely, seeking the saddle point where both equilibrium (tension reduction) and change (tension-induction) are optimized. We assume that individual and situational differences in the operative saddle point should be associated behavioral variation. We have selected a choice situation where varying amounts of risk are associated with the alternative choices to test hypothesis flowing from this assumption, and to explore the construct validity of a risk-taking test. In individuals who choose a lower risk alternative equilibrium motives dominate in that situation, and the obverse holds for individuals chosing a higher risk alternative. Observing the amount of risk associated with choices serves as a basis for classifying individuals by dominant motive. If behavior is under the control of tension-reduction type motives, their persistence at a task should vary with the absolute degree of uncertainty of success, i.e., the more equi-probable success and failure are at a binary-response (correct-incorrect) task, the greater the probability of persistence at the task. We hypothesize that: (1) for no risk, (tension-reduction oriented) persons, persistence at a binary-response task will

increase linearly with increases in the level of success; and (2) for risk (change oriented) persons, persistence will increase with increasing success up to a .5 level of success and will decrease with increasing levels of success from .5 to 1.0.

METHOD

Design and Subjects

107 S̲s, all male undergraduates at Syracuse University, participated in the study. Subjects were approached in their dormitory rooms by one of two E̲s and asked if they would like to participate in an "educational research project." If they agreed to participate, they were then given the choice of participating under either one of two experimental conditions or, as described to S̲, in either one of two studies that were being conducted by E̲. They were told that in one of the studies they would be paid $1 for their services while in the second study they would not be paid immediately but had a 1/60 chance of winning $60. It was explained that 60 S̲s would, as a result of a drawing, be given the full cash amount available for payment of subjects. After S̲ had made his choice regarding the study in which he wished to participate he was then administered a Risk-Taking Questionnaire.

Following administration of the questionnaire, each subject engaged in the experimental task. The experimental task was described to S̲s as a pilot study in psycholinguistics and it was emphasized that E̲ was primarily interested in perfecting the method of presenting the task and not particularly concerned about S̲'s performance. Therefore, E̲ added that "after a few trials at the task you are free to stop or continue as you wish." The task materials consisted of a series of

Mbundu words and a parallel list of English words. For each pair, S decided whether the English word was a "reasonable equivalent of the African word," wrote his answer on the provided sheet and E provided immediate feedback regarding the "correctness" of the response. The actual instructions used examples of the Mbunda-English pairs as follows:

PSYCHOLINGUISTICS PROJECT

The task we are going to ask you to do is part of an ongoing research project in psycholinguistics. Specifically, we are interested in determining whether or not a person who has no knowledge of a language can make better than chance guesses regarding the meaning of certain words in that language. In other words, the possibility exists that all languages have a common core and that having learned one language you can make some good guesses about the meanings of words in a language which is from all appearances quite strange and foreign to you. Below is listed a series of words from the language spoken by the Mbundu, a primitive tribe in Central Africa. The words have been transcribed in such a way that they are readily pronounceable by someone who knows only English. Consider each word carefully. If you wish, attempt to pronounce it. Then take note of the English word which follows. If in your judgment the English word is at least a rough equivalent of the Mbundu word write "correct" over the pair as illustrated:

bha-ti correct house

If in your judgment the English word is not a reasonable equivalent then completely mark out the word with your pencil, as illustrated below:

bha-ti ~~house~~

If you cannot decide whether the English word is or is not a reasonable equivalent simply guess.

Again, tell me your answer after you've made your decision and you will get immediate information regarding the correctness of your response.

We want to emphasize that this is just a pilot study and we are primarily interested in perfecting research methods. Therefore, after you have made a number of judgments you may quit any time you wish.

If there are no questions turn to the first pair of words. Consider the English word carefully. Is it a reasonable equivalent of the Mbundu word?

1. kpa-dzeng	apple
2. syal-li	horse
3. gyell-gela	girl
4. nyij-e	woman

After S has responded to ten of the word pairs he was then reminded that he had the chance to drop out at any point in the experiment. "Correct" and "incorrect" responses from E were not made to be contingent upon the actual answers of Ss, rather it was predetermined that certain Ss would receive a 15% reinforcement schedule, others a 35% reinforcement schedule, a 65% reinforcement schedule, and a 90% reinforcement schedule, regardless of answers given. Reinforcement schedule is equated, here, with level of success.

A breakdown of Ss participating under each condition is contained in Table 1.

TABLE 1

NUMBER OF SUBJECTS UNDER EACH CONDITION

	Reinforcement Ratio			
	.15	.35	.65	.90
Nonrisk ($1.00 payoff)	n=16	n=14	n=14	n=15
Risk (1/60 chance of winning $60.00)	n=12	n=13	n=11	n=12
		N = 107		

Measurement Instruments

The risk-taking questionnaire used was developed by Wallach and Kogan (1959; 1961; 1964). Briefly, this projective-type instrument requires S to give decision making advice in 12 different hypothetical situations. An example of one of the items is:

Mr. A, an electrical engineer, who is married and has one child, has been working for a large electronics corporation since graduating from college five years ago. He is assured of a lifetime job with a modest, though adequate, salary, and liberal pension benefits upon retirement. On the other hand, it is very unlikely that his salary will increase much before he retires. While attending a convention, Mr. A is offered a job with a small, newly founded company which has a highly uncertain future. The new job would pay more to start and would offer the possibility of a share in the ownership if the company survived the competition of the larger firms.

Imagine that you are advising Mr. A. Listed below are several probabilities or odds of the new company's proving financially sound. Please check the lowest probability that you would consider acceptable to make it worthwhile for Mr. A to take the new job.

____The chances are 1 in 10 that the company will prove financially sound.
____The chances are 3 in 10 that the company will prove financially sound.
____The chances are 5 in 10 that the company will prove financially sound.
____The chances are 7 in 10 that the company will prove financially sound.
____The chances are 9 in 10 that the company will prove financially sound.
____Place a check here if you think Mr. A should not take the new job no matter what the probabilities.

A score of 1, 3, 5, 7, 9, or 10 was assigned to each item depending on the probability level checked by S. Thus if a "1 in 10" item were checked a score of 1 would be assigned; if a "5 in 10" item were checked a score of 5 would be assigned, etc. A subject's risk taking score was obtained by summing over the twelve items. A high score was therefore indicative of low risk-taking orientation and a low score of high risk-taking orientation.

It should be noted that a second index of Ss' risk-taking orientation, a behavioral one, was embedded in Ss' choice of experimental condition, i.e., whether he chose to receive low but immediate payment for his services or take a chance of obtaining a higher pay off.

RESULTS

The results are presented in Tables 2 and 3. It was predicted that the relationship between success level (reinforcement schedule) and task persistence would be linear for "no risk" Ss and curvilinear, peaking at intermediate levels of success, for the "risk" Ss. In effect, a significant interaction of main effects was predicted. The analysis of variance results (Table 2) reveal that both main effects are statistically reliable, but the interaction component is negligible.

TABLE 2

SUMMARY OF ANALYSIS OF VARIANCE FOR PAYMENT AND SUCCESS CONDITIONS

Source	df	Mean Square	*F*	*P*
Choice of Payment (Risk-Nonrisk)	1	4738.29	7.75	.01
Reinforcement condition	3	3245.46	5.31	.01
Payment x Success	3	59.90	<1.00	--

TABLE 3

MEANS AND STANDARD DEVIATIONS UNDER ALL EXPERIMENTAL CONDITIONS: NUMBER TASK TRIALS COMPLETED

		.15	.35	.65	.90
No risk ($1.00 payment)	$\bar{X}$ =	24.31	33.00	47.50	30.93
	S.D.=	19.20	19.50	30.64	33.92
Risk (1/60 chance of $60.00 payment)	$\bar{X}$ =	33.42	47.38	63.64	44.92
	S.D.=	20.71	22.58	35.82	24.94

Inspection of the means presented in Table 3, shows similar task-persistence effects of success levels for both "risk" and "no risk" Ss. Both conditions peak at the .65 level, yielding the curvilinear relation predicted for the "risk" Ss. These findings suggest that an intermediate level of success (.65) represent a saddle point between tension-reduction motivation and change-oriented motivation, for all Ss.

The evidence in Table 3 also points to a clear and main difference between risk and no risk Ss. The curve for the "risk" Ss is elevated over the "no risk" Ss. The differences between the two groups in mean number of trials completed (persistence) are 9.11 at the .15 level, 14.38 at the .35 level, 16.14 at the .65 level, and 13.99 at the .90 level. There is a definite tendency for "risk" Ss to demonstrate a greater persistence at the task.

DISCUSSION OF THE EXPERIMENTAL FINDINGS

The major finding of this study is that the kind of reinforcement which is implicit in "being right" or successful at a task is not linearly related to task persistence. Subjects showed greatest persistence under moderate (.65) rather than under maximum (.90) reinforcement conditions. This general pattern obtained whether or not S was risk-inclined, as measured by his choice of experimental condition. This finding lends support to those theoretical positions which are critical of the validity of the law of effect in the case of complex human behavior (Atkinson, 1965; White, 1959, 1960). That is, the results confirm the notion that individuals are not pleasure-bound in the sense that they always seek success. Risk-taking and flirting with failure is perhaps a characteristic feature of human behavior. At the least, this study would indicate that a certain amount of failure does seem to increase the interest value of the task.

It should be noted that the relationship between reinforcement SUCCESS and persistence is not to be viewed as a simple variate of the well-known relationship between partial reinforcement and extinction. In studies of extinction rate the focus is on the persistence of a behavior in the absence of reinforcement. In the present study a definitely different situation obtains. Persistence was observed as reinforcement was being administered. In other words, the focus was not on the effect of reinforcement on the maintenance of an association bond. Rather, the results shed light on a perhaps related but clearly distinguishable phenomenon, viz., the effect of reinforcement on the attractiveness of a task. One may infer from the results that a task has its greatest interest value when reinforcement is less than maximum. Subjects are most interested when there is a certain amount of uncertainty involved in the outcome.

Stated in this way the results are not surprising, especially in view of the research of Berlyne (1960), among others. What is intriguing about the present findings is that they provide some basis for arguing that any application of reinforcement theory to complex human behavior may have to be moderated by a risk-taking model. It may be noted in passing that Siegel (1964) has pointed out that human choice and decision behavior cannot in many important instances be accounted for in reinforcement-pay off terms. Subjects often make "unpredictable" and "irrational" decisions in terms of the subjectively expected utility matrices. As Siegel suggests that these choices are not simply to be brushed aside as random errors. Rather, they are indications of the fact that a separate interest or attitudinal function emerges with the development of SEU. Furthermore, Siegel implies that this interest factor is obviously not a direct linear function of SEU. A similar argument can be based on the present results. Moreover, the present results provide some clue as to the nature of this interest or attitudinal function.

Although the results do conform the essential hypothesis, they leave unanswered more questions than they answer. Among other things, one may wonder on the basis of Rotter's work (1966) whether Ss perceived the reinforcement to be contingent on their demonstrated skill (as Es hoped they would) or as a purely chance factor. Subsequently, a question of paramount interest is, how would differential perception in this regard effect the results?

CONSTRUCT VALIDITY OF A RISK-TAKING MEASURE

A risk-taking questionnaire that has been used extensively is presented in Wallach and Kogan (1959). The construct validity of this test will be explored within the context of the experiment designed to test the above hypotheses. Giving persons a choice between high and low risk alternatives provides a direct behavioral measure of risk-taking. Such measures are expensive and time consuming. It is convenient to have available reliable and valid tests which are easy to administer. With this objective in mind, each subject was administered the twelve item questionnaire. Two criteria of construct validity are explored, namely; internal consistency among the items, and correlation with the behavioral measure of risk-taking.

The risk-taking questionnaire devised by Wallach and Kogan (1959) consists of situations in which the S serves as an advisor to a hypothetical person. Each situation describes a person who is faced with a binary choice between two alternatives which differ in both attractiveness and probability of outcome. The S is asked to indicate the minimum probability of success he would accept before advising the person to choose the focused alternative. A brief description of each problem is given in Table 4, the italicized alternative being the focused one. The choice the S must make is the probability that the outcome at issue will occur.

Internal Consistency. In Table 5 the intercorrelations among the items are presented.

These data suggest that the set of 12 items as a whole are relatively independent items. Less than 50% of the possible 66 entries are reliable at the .01 level and the mean proportion of inter-item variance accounted (r^2) is approximately 10%. These findings suggest that responses are not artifacts of the manifest features of the questionnaire such as its format, forced consideration of probabilities, forced choice, etc. Any clustering of items recovered by factor analysis procedures are not due to artifacts of the test.

TABLE 4
DESCRIPTION OF WALLACH AND KOGAN RISK-TAKING ITEMS

Item	Description of Choice	Outcome at Issue
1.	taking a high-paying job in a "growth" company vs. remaining in lower-paying job in a stable company.	growth company will prove to be financially sound
2.	choose a serious operation vs. reject operation and possibly become an invalid.	successful operation
3.	invest money in a growth corporation vs. invest money in a blue chip corporation.	growth stocks will double their value
4.	select risky football play to win vs. select more certain play to tie the score.	risky play will work
5.	build a plant in a potentially unstable foreign country for high return vs. build in USA for smaller return.	foreign country will remain politically stable
6.	enter graduate program at tough but prestigious graduate school vs. easier and less prestigious school.	will succeed at tough but prestigious school
7.	select chess move that may bring quick victory vs. (no stipulated alternative action).	play will succeed
8.	choose career as concert pianist with many unknowns vs. medical career and certain prestige and financial rewards.	succeed as concert pianist
9.	attempt to escape from POW camp and possible execution vs. subsistence-level existence in POW camp.	successful escape
10.	run for political office as minority party candidate and at great financial sacrifice vs. (no stipulated course of action.	win election
11.	work at long-term difficult scientific problem vs. a series of short-term problems of less scientific significance but for which the solutions are more certain.	successful solution of long term problem
12.	decide to marry in face of known incompatibilities vs. (no stipulated alternative action).	happy and successful marriage

TABLE 5

INTERCORRELATION AMONG WALLACH AND KOGAN RISK-TAKING ITEMS

(Pearson Product Moment r)

Item	2	3	4	5	6	7	8	9	10	11	12
1	265	367	266	293	304	320	220	177	095	300	412
2		370	317	173	470	209	350	290	318	119	305
3			037	223	239	101	269	053	268	158	366
4				003	218	288	134	344	355	281	224
5					270	051	245	018	025	-026	159
6						027	350	199	196	178	369
7							172	260	207	213	171
8								047	114	118	161
9									269	222	084
10										289	277
11											201
12											

N = 107
r = .23 at .01 level of significance
r = .164 at .05 level of significance

The results of a principal-components factor analysis and varimax rotation are presented in Table 6. Positive loadings reflect a high certainty orientation of the item and negative loadings reflect a high risk orientation.

No clear, unambiguous interpretation of the evidence in Table 6 forces itself upon the reader. Although all loadings of principal

TABLE 6

FACTOR LOADINGS

Item	Principal Component Factors				Varimax Rotation Loadings			
	I	II	III	IV	I	II	III	IV
1	.64	.14	.53	.00	.22	.03	.68	-.46
2	.68	.00	-.42	.00	.64	-.44	.01	-.23
3	.55	.36	.12	-.38	.28	.01	.05	-.72
4	.54	-.49	-.11	.13	.12	-.66	.32	-.02
5	.34	.55	.11	.34	.59	.33	.28	-.12
6	.62	.29	-.36	.00	.67	-.24	-.04	-.29
7	.45	-.35	.41	.40	.02	-.26	.76	.04
8	.49	.35	-.18	.33	.68	-.02	.18	-.07
9	.44	-.49	-.22	.28	.18	-.65	.28	.17
10	.53	-.35	-.25	-.39	.04	-.67	-.08	-.40
11	.46	-.36	.30	-.21	-.19	-.39	.38	-.39
12	.61	.16	.19	-.40	.16	-.14	.16	-.73

components analysis Factor I are statistically reliable, suggesting a general factor, all are relatively low values. While the loadings obtained by the varimax rotation procedure are larger than by principal components analysis, no strikingly dominant values are obtained. Furthermore, given the loadings obtained and restricting attention to loadings of an absolute value of .50 or greater, there is no obvious substantive coherence to be obtained.

One curious condition that can be observed in the varimax results is the consistent alternation between positive and negative loadings in the factors. This observation coupled with the admitted modest general factor loadings (Principal Components Factor I) does suggest that the set of items do point to a general dimension that can be called risk-taking tendency, at least within the context of the questionnaire.

Correlation with a behavioral measure. To ascertain the degree and relation between the Wallach-Kogan questionnaire scores and the S's choice of risk - no risk experimental condition the biserial r was computed and a value r =-.62 was obtained. This value and its sign suggests that the questionnaire items do predict the actual risk - no risk choices, at a statistically significant level (.0001 level). As statistically reliable as these results may be, the crucial question is: does substituting the risk-taking questionnaire scores for the actual choices lead to the same conclusions?

The "inclinition toward risk" as indicated by the Wallach-Kogan scale does not show this pattern. To determine whether the risk-taking tendency as indexed by this paper and pencil measure would indicate a similar pattern of persistence several analyses were performed. A separate Pearson r was obtained between Ss' scale scores and number of trials under each of the four levels of success. If questionnaire scores related to task persistence in a manner directly analogous to the risk index based on actual choice it would be expected that correlation coefficients would show increase and decrease trends analogous to those noted previously in the same case of means. As seen in Table 8 this does not occur.

TABLE 7

THE RELATIONSHIP BETWEEN WALLACH-KOGAN SCALE SCORES AND CHOICE OF EXPERIMENTAL CONDITION

No Risk ($1.00 payment) $\overline{X} = 73.30$ S.D. = 10.08

Risk (1/60 chance of $60 payment) $\overline{X} = 55.98$ S.D. = 19.95

$t = 5.82$ ($P < .0001$)

Biserial $r = -.62$

TABLE 8

CORRELATION OF WALLACH-KOGAN SCALE SCORES WITH NUMBER OF TRIALS IN EACH OF THE FOUR SUCCESS CONDITIONS

	.15	.35	.65	.90
Pearson r	.04	-.40	-.40	-.53
n =	28	27	25	27
_P_ =	--	.05	.05	.01

NOTE: A negative correlation reflects a positive relationship between risk taking and number of trials.

It is interesting that the questionnaire score should show an increasingly negative correlation with number of trials as the success level is increased. The expectation was that rksk-takers should show the greatest amount of persistence at either .35 or .65 ratio and non-risk takers should show the greater persistence possibly at the .15 level but most assuredly at the .90 level. If the results would have fulfilled this expectation 0.00 or negative correlation should have been found under the .15 reinforcement condition, high negative correlations under both the

.35 and .65 conditions and 0.00 or low positive correlations under the .90 condition. Instead, the results indicate that low risk-taking as measured by the Wallach-Kogan scale is associated with greater persistence not only under the conditions of moderate reinforcement but even to a greater degree under maximal level of success.

DISCUSSION OF THE CONSTRUCT VALIDITY FINDINGS

The Wallach-Kogan questionnaire for measuring risk-taking predisposition cannot be substituted for a behavioral measure, at least not in its present state. Although the Wallach-Kogan Scale does not produce artifactual responses, one cannot con fidently proclaim that at the present state of the art, use of paper and pencil measures of behavioral predispositions is risky if not wasteful of experimenter's time, energy and money.

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CHAPTER VI

SYNTACTICAL COMPLEXITY AND INFORMATION ACQUISITION

The study, as reported here, explores the impact of syntactical complexity (as represented by relative clauses) of a message upon the accuracy with which the information contained in the message is acquired.[1] It was designed to yield empirical evidence which serves as a basis for making inference about Ss information processing.

In a classroom setting, two groups of Ss (total N=36) were presented with a series of 6 two-sentence paragraphs. Each paragraph was projected on a screen, for 15 seconds and the series was shown three times in succession.

Each two-sentence paragraph was made up of five nouns, four verbs, and either the word "and" or "that." While all words are semantically respectable, they were used to form uncommon, if not nonsensical sentences. For example, nouns such as triangles, circles, stars, squares, and rectangles, were used in combination with verbs such as join, avoid, like, and strike to form sentences such as: stars like rectangles and rectangles avoid circles. Familiar words were chosen to avoid both the necessity of learning a list of nonsense syllables and also the awkwardness of forming or hearing grammaticalized nonsense strings as: KIBS GUGGED JIKS.

Immediately after the third presentation of the six paragraphs, the Ss were administered a two part test. The first part consisted of six pages. On each page, the nouns and verbs used in a particular paragraph together with both the words "and" and "that" were listed.

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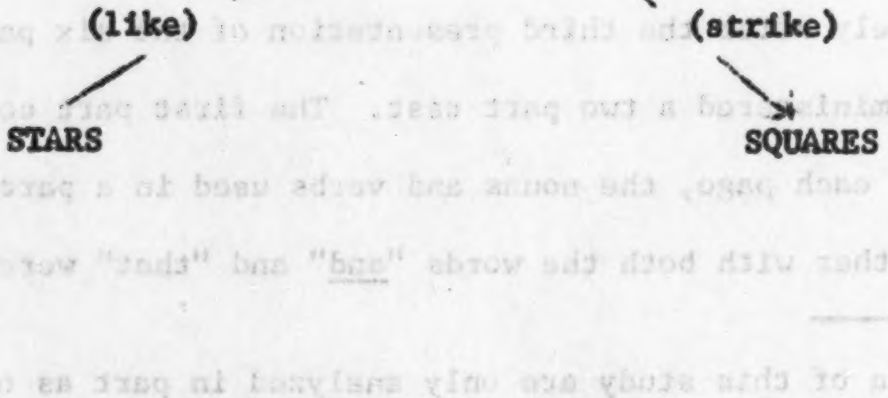
[1] The data of this study are only analyzed in part as of this date (August 31, 1966), hence the highly tentative tenor of this report.

Ss were instructed to write a two sentence paragraph that "is consistent, i.e., does not contradict, the information in the paragraph on (topic name) you were just shown." The second part consisted of a list of 72 simple kernel sentences, i.e., subject-verb-object. Ss were instructed to use the "information from the paragraphs you have just seen, (and) indicate for each of the following statements whether it is true or false by circling the appropriate letter: T or F."

One third of the true-false items (24) called correct items, consisted of a kernel sentence that appeared in one of the paragraphs. One third consisted of sentences in which the nouns used as subject and object in the paragraphs, were used in the reverse order, called obverse items. The remaining third consisted of kernel sentences in which the noun and verb constituents had not appeared in any combination in the stimulus paragraph. We shall call these "outside items."

The terms "correct," "obverse," and "outside" can be illustrated by referring to Figure 1. In this diagram the simple assertions or

FIGURE 1



kernel sentences of a paragraph on FORMS is displayed as a directed graph. The four kernels in the FORMS paragraph are represented by the verb-labelled arrows connecting a subject-noun and an object-noun. (In the abstract, the graph can be read: the antecedent noun or agent transmits the labelled effect to the following noun or target.) Thus, in the stimuli presented to Ss, following ordered triples did appear:

a) Triangles join rectangles.

b) Stars like rectangles.

c) Rectangles avoid circles.

d) Rectangles strike squares.

These are the "correct" items. "Obverse" items are exemplified by the following sentence: Rectangles like stars. An "outside" item consists of elements which did not appear together in any combination in the stimuli paragraphs, e.g., Stars avoid circles.

Five types of sentences which were used in the stimuli paragraphs, are listed and described in Table 1. The simple compound sentences are included to serve as a basis for comparison in the analysis of the more complex sentence forms. Sentence types I through IV include a standard relative pronoun THAT to introduce various types of subordinate constructions.

The four types of complex sentences vary as combinations of two conditions: (1) the relative pronoun is used as a subject or as an object in the subordinate construction, and (2) the antecedent to which the relative pronoun is used as a subject or as an object in the main sentence. Some of these combinations have conventional names. Type I is a "right-branching" sentence; Type III is a "nested" sentence; and Type IV is a "self-embedded" sentence. Type II has elements of both right-

TABLE 1

Simple Compound Sentence:	((S → V → O) and (S → V → O)) e.g. Triangles join rectangles.
Type I:	S → V → O → (that → V → O) e.g. Triangles join rectangles that avoid circles.
Type II:	S → (that → V → O) → V → O e.g. Rectangles that avoid circles strike squares.
Type III:	S → V → O → ((that) ← (S → V)) e.g. Triangles join rectangles that stars like.
Type IV:	S → ((that) ← (S → V)) → V → O e.g. Rectangles that stars like strike squares.

branching and self-embedding structures.

Chomsky (1965), Miller and Isard (1964), Yngve (1960) and others have made much of the distinction between branching, nesting, and self-embedding. Rather lengthy quotes from Chomsky and from Miller and Isard show the extent and nature of the concern with these syntactic forms.

> The more acceptable sentences are those that are more likely to be produced, more easily understood, less clumsy, and in some sense more natural. . . . Acceptability is a concept that belongs to the study of competence. (Chomsky, 1965, p. 11)
>
> The effect of these superficial aspects of sentence structure on performance has been a topic of study since almost the very inception of recent work on generative grammar, and there are some suggestive observations concerning their role in determining acceptability (that is, their role in limiting performance).

Summarizing this work briefly, the following observations seem plausible:

(4) (i) repeated nesting contributes to unacceptability
(ii) self-embedding contributes still more rapidly to unacceptability
(iii) multiple-branching constructions are optimal in acceptability
(iv) nesting of a long and complex element reduces acceptability
(v) there are no clear examples of unacceptability involving only left-branching or only right-branching, although these constructions are unnatural in other ways--thus, for example, in reading the right-branching construction "this is the cat that caught the rat that stole the cheese," the intonation breaks are ordinarily inserted in the wrong places (that is, after "cat" and "rat," instead of where the main brackets appear)

In some measure, these phenomena are easily explained. Thus it is known (cf. Chomsky, 1959a; and for discussion, Chomsky, 1961, and Miller and Chomsky, 1963) that an optimal perceptual device, even with a bonded memory, can accept unbounded left-branching and right-branching structures, though nested (hence ultimately self-embedded) structures go beyond its memory capacity. Thus case (4i) is simply a consequence of finiteness of memory, and the unacceptability of such examples as (2ii) raises no problem.

If (4ii) is correct, then we have evidence for a conclusion about organization of memory that goes beyond the triviality that it must be finite in size. An optimal finite perceptual device of the type discussed in Chomsky (1959a) need have no more difficulty with self-embedding than with other kinds of nesting (see Bar-Hillel, Kasher, and Shamir, 1963, for a discussion of this point). To account for the greater unacceptability of self-embedding (assuming this to be a fact), we must add other conditions on the perceptual device beyond mere limitation of memory. We might assume, for example, that the perceptual device has a stock of analytic procedures available to it, one corresponding to each kind of phrase, and that it is organized in such a way that it is unable (or finds it difficult) to utilize a procedure φ while it is in the course of executing φ. This is not a necessary feature of a perceptual model, but it is a rather plausible one, and it would account for (4ii). See, in this connection, Miller and Isard (1964).

The high acceptability of multiple-branching, as in case (4iii), is easily explained on the rather plausible assumption that the ratio of number of phrases to number of formatives (the node-to-terminal node ratio, in a tree-diagram of a sentence) is a rough measure of the amount of computation that has to be performed in analysis. Thus multiple coordination would be the simplest kind of construction for an analytic device--it would impose the least strain on memory. For discussion, see Miller and Chomsky (1963).

Case (4iv) suggests decay of memory, perhaps, but raises unsolved problems (see Chomsky, 1961, note 19).

Case (4v) follows from the result about optimal perceptual models mentioned earlier. But it is unclear why left- and right-branching structures should become unnatural after a certain point, if they actually do. (Chomsky, 1965, p. 13-14.)

It is interesting, therefore, that in spite of our inability to cope with complicated parenthetical constructions in vocal forms, all natural languages, including English, make provision for just such constructions in the sentences we speak. For example, the sentence, The man who said that a cat killed the rat is a liar, is perfectly grammatical and has one sentence (a cat killed the rat) nested inside of another (the man who said that is a liar). But now carry the process another step and put the dog chased the cat inside a cat killed the rat, in the form of a relative clause: a cat that the dog chased killed the rat. When all three are put together into a single sentence, The man who said that a cat that the dog chased killed the rat is a liar, the result begins to be a bit confusing. Add another relative clause for the sentence, the boy owns the dog, and we get a really difficult, but still perfectly grammatical sentence: The man who said that a cat that the dog that the boy owns chased killed the rat is a liar. Or we can work in the other direction, and wrap another sentence around that one: It is more likely that the man who said that a cat that the dog that the boy owns chased killed the rat is a liar than not. Unless special and rather arbitrary rules are introduced to prevent it, this sort of grammatical onion could grow indefinitely.

Obviously, people do not talk this way. There are in English alternative constructions that enable us to say all this in a much simpler way: It is more likely than not that the man is a liar who said that the rat was killed by a cat that was chased by the dog that is owned by the boy. Since both are equally acceptable according to the rules of grammar, any preference for the latter must have some psychological, rather than linguistic, explanation. This fact seems to have been clearly stated first by Yngve (1960), although he used it as the basis for certain generalizations about linguistic structure and evolution that we would not endorse (Miller and Chomsky, 1963). Yngve points out, quite correctly, that the discontinuous constituents of the nested sentence impose a severe load on our short-term memory, whereas the alternative form does not. In order to deal with nested constructions, the language user must hold in memory the still unresolved portion of one constituent while he is processing another. When two or three initial portions must be remembered, all in proper order, the task becomes quite difficult. Nested constructions, therefore, pose a problem of some psychological interest. (Miller and Isard, 1964, p. 292-293).

Implicit in both statements are two attributes of individuals as language users. First, there is the notion that syntactic forms of linguistic structures can be ordered with respect to difficulty in processing the content of the linguistic structure; and second the ordering is universal to all language users. We hold that grammatical analysis of language behavior is a rich source of data from which inferences about cognitive processing are made. However, we assume that neither syntactical or semantic factors alone or in interaction with each other are sufficient to account for language behavior or verbal learning in the broadest sense.

For example, Chomsky's assertion ". . . that an optimal perceptual device, even with a bounded memory, can accept unbounded left- and right-branching structures, though nested (hence ultimately self-embedded) structures go beyond its memory capacity," needs to be challenged--not because he is speaking of a "perceptual device," but because he bases his assertion on the finiteness of memory. One can argue alternatively, that structure or organization of memory is the critical dimension. For example, a serial or associative memory organization will be taxed by any degree of nesting, while a functionally ordered memory structure (e.g. the digraph in Figure 1) conceivably will be taxed only by the bounds of the graph. On the other hand, an associatively organized memory may be envisioned as encountering no difficulty in forming branched construction, while the functionally ordered memory may or may not encounter problems in generating branched construction.

It is apparent the recessive function in the language user are not necessarily but may well be specific. We shall proceed with the assumption that they are specific to the organizational mode of the users cognitive system.

EXPLORATION OF THE DATA

Responses to the first test, in which *S*s were instructed to produce two-sentence paragraphs were classified according to sentence structure used. Three categories were used: simple kernel sentences, conjunctive sentences, and complex sentences involving subordinate constructions. The number of right answers to the true-false test were counted for type of sentence, for type of test item, and for the total. For purposes of exploring the data, *S*s were divided into above and below median for type of sentence produced and for total accuracy score on the true-false test.

Median test comparisons of the true-false scores by each of the categories of the first test are presented in Tables 2, 3, and 4. The association between total accuracy scores and frequency of reproduced sentences reached reliable levels only for the complex-subordinate category of sentence structure. *S*s who used the complex sentence tended to also be more accurate in their recall of information presented in the stimulus paragraphs.

TABLE 2

MEDIAN TEST: Total Accuracy Score by
Frequency of "Simple" reproduced sentences

	Frequency of "Simple", Reproduced Sentences		
Total Accuracy Score	Above	Below	
Above	11	7	18
Below	5	13	18
	16	20	36

$\chi^2 = 2.90$
N. S.

TABLE 3

MEDIAN TEST: Total Accuracy Scores by Frequency of "Conjunctive", Reproduced Sentences

Total Accuracy Score	Frequency of conjunctive Reproduced Sentences Above	Below	
Above	12	6	18
Below	6	12	18
	18	18	36

$\chi^2 = 2.78$
N.S.

TABLE 4

MEDIAN TEST: Total Accuracy Score by Frequency of "Complex", Reproduced Sentences

Total Accuracy Scores	Frequency of Complex, Reproduced Sentences Above	Below	
Above	13	5	18
Below	4	14	18
	17	19	36

$\chi^2 = 9.12$
$p < .01$

In Tables 5 and 6 mean accuracy scores (Test 2) are presented for each of the five types of sentences listed in Table 1. Since the means entered in these tables are related to the mean total accuracy scores (Test 2), which in turn is highly correlated with the median of those scores, it is not meaningful to apply inferential statistics to the comparison of the above and below groups. Comparisons between means of simple conjunctive sentences and each of the complex types for each row in Table 5 is presented in Table 7.

TABLE 5

MEAN ACCURACY SCORES FOR FIVE SENTENCE TYPES FOR ABOVE AND BELOW TOTAL ACCURACY SCORE MEDIAN

Total Accuracy Score Median	Simple Conjunctive sentence	Sentence Type				
		I	II	III	IV	N
Above	9.91	7.72	7.06	7.33	6.61	17
Below	6.50	5.21	6.26	6.16	5.62	19
All Ss	8.02	6.48	6.61	6.75	6.11	
Differences Between Means	3.41	2.51	.80	1.17	.99	

TABLE 6

MEAN ACCURACY SCORES FOR FIVE SENTENCE TYPES FOR ABOVE AND BELOW TOTAL FREQUENCY OF COMPLEX SENTENCES REPRODUCED

Total Accuracy Score Median	Simple Conjunctive Sentence	Sentence Type				N
		I	II	III	IV	
Above	9.15	7.18	7.01	7.46	6.42	17
Below	7.05	5.85	6.26	6.26	5.85	19
Differences Between Means	2.10	1.33	.75	1.20	.57	

The data indicate that for the group above the median of total accuracy scores (Test 2), the accuracy of recalling kernel sentences present in a simple conjunctive form accounted for a large part of their superiority in both total accuracy (Test 2) and in frequency of complex, reproduced sentences (Test 1). The pattern of differences in means among the five sentence types is the same both Test 1 and Test 2 data. Kernel sentences presented in Type I and Type III forms are associated with the greatest difference in means, suggesting that, the better performances of the "above" group can in part be accounted for by their greater efficiency in handling information contained in sentences that are right branching, i.e., the subordinate clause follows the complete main sentence.

It is also interesting to note that the means for inferior group tended to show less variability. While their inferiority might reflect a less efficient mnemonic system generally, the evidence in Tables 8 and 9 points to a plausible alternative. The words used in the set of

TABLE 7

"t" TEST: MEAN KERNEL SENTENCE ACCURACY SCORES COMPARED WITH MEAN OF OTHER FOUR SENTENCE TYPES, FOR GROUP ABOVE AND BELOW TOTAL ACCURACY SCORE MEDIAN

Kernel Sentence Type Compared With:	Total Accuracy Score Median	
	Above	Below
Type I	$t = 4.38$	$t = 2.98$
	$p < .01$	$p < .01$
Type II	$t = 4.07$	$t = .44$
	$p < .01$	ns
Type III	$t = 4.53$	$t = .72$
	$p < .01$	ns
Type IV	$t = 5.79$	$t = 1.83$
	$p < .01$	ns

TABLE 8

"t" TEST: MEAN ACCURACY SCORES FOR THREE TYPES OF TEST ITEMS FOR ABOVE AND BELOW TOTAL ACCURACY SCORE MEDIAN

Total Test Score Median	Test Item Type		
	Correct	Obverse	Outside
Above	18.4	16.4	14.9
Below	13.2	13.1	9.9

TABLE 9

"t" TEST: MEAN "CORRECT" TEST ITEM TYPE ACCURACY SCORES COMPARED WITH MEAN OF "OBVERSE" AND WITH "OUTSIDE" TEST ITEM TYPE, FOR GROUP ABOVE AND BELOW TOTAL ACCURACY SCORE MEDIAN

"Correct" Test Item Type Compared With	Total Accuracy Score Median Above	 Below
"Obverse" Type	$t = 2.53$ $p < .05$	$t = 0$ ns
"Outside" Type	$t = 3.58$ $p < .01$	$t = 2.46$ $p < .05$

"correct" kernels for a paragraph are identical with those used in the "obverse" sentences. The singular difference is the functional ordering of the words. The means for "correct" and "obverse" items is almost identical for the "below" group, and both of these means was reliably greater than for "outside" items. A very plausible interpretation of these data is that the inferior Ss learned to recognize combinations of noun-verb-noun but not the order. Because the sentences were composed of familiar words but used to assert nonsense, the first level of learning is , a kind of combinatorial learning. In the case of the stimulus paragraphs, combinatorial learning entails perceiving and storing simple association of elements that appear together in an unordered list. A higher level of learning requires not only the perceptual process of combinatorial learning, but also either a simple storing process preserving the order (subject-verb-object) or a process for generating a functionally interlinked structure of information perceived. The conclusion cannot be reached, from these data, that the superior Ss can be characterized by a functionally ordered mnemonic system.

SUMMARY

The relation between syntactic form of paragraphs and accuracy of recall and reproduction of the information in the paragraphs is explored. On the basis of data available for this report, conclusions are at best suggestive. Ss who were superior in recall and reproduction of information in the stimuli paragraphs tended to process information in right branching sentences more efficiently than the inferior Ss. Evidence was presented which points to the tentative inference that inferior Ss operated with a simpler memory system.

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EPILOGUE

The papers presented in this volume contribute to both behavioral science theory and practice. The theoretical papers, (Chapter I, II, and III) not only extend the theoretical framework developed by the principal investigators in their earlier work, but also call attention to and elaborate upon fundamental social psychological issues. Coupled with the empirical evidence presented in the last three chapters, the theoretical effort provides the practitioner with understanding of some important facets of motivation and behavioral control. In the following paragraphs, we shall attempt to describe the principal results of the empirical studies, and to identify their educational relevance.

In the present studies, as in the past, we have proceeded from the assumption that socially mediated evaluations by other persons contribute in a major way to the development, maintenance and change of an individual's self-concept. When the concept of self is explored within a behavioral vacuum, it is an intriguing topic in the humanistic tradition but is mere table-talk in the tradition of behavioral scientists.

Having demonstrated the dependence of concepts of self upon the critical reactions of others, we have turned our attention in the present study to the behavioral effects of variations in self-concepts and related variables. Our point of entrance into this enterprise was a natural one. We have typically translated the abstract concept of self into "self-ratings of competence to perform." In a sense, a person is what he thinks he can do. While individuals may reduce the total set of their self-ratings into global evaluations of self confidence, we believe that it is the situationally-relevant, specific judgments about behavioral competence that have determinable behavioral effects.

Robert White's discussion of the relation between competence and motivation is a seminal piece by itself, but has been especially provocative in our ruminating about self theory. White's principal contribution to our thinking lies in his strong argument for an alternative to fixed-state motivational concepts. (Berlyne, Helson, and others offer similar arguments). The organism does not respond merely to reinforcers, rewards, punishment in a linear fashion. Risk, curiosity, and novelty, although potentially averse in consequences, are as powerful arousers as need gratification, drive reduction and goal attainment. White seems to say that ontological growth and development is not exclusively a biological phenomenon. It is also a psychological one, manifested in response to challenge and risk, curiosity and being aroused by novelty. Being intrigued by uncertainty is no more pathological than a demand for invariance. This is the point of our departure into examinations of the interaction of self, behavioral choice, and motivation.

When a person is required to choose a response from among alternative courses of action, his choice is a product of a decision process in which self-rated competence and situational stresses are critical variables. In general, an individual will, under stressful conditions, tend to choose that alternative for which he has experienced greatest success in the past. Under less stressful conditions that alternative will be chosen for which the person has experienced some success but which also offers an opportunity to become more successful. These generalizations suggest another: the greater the demands in the situation, the more that behavior will be dependent upon immediate criticism (signs of success or failure).

So stated, the findings of the experiments in Chapters IV and V, are applicable to the classroom problem of maintaining orderliness in classroom behavior, and at the same time facilitate pupil development and learning. Socially mediated evaluations do contribute to the maintenance of order. The more frequent and certain the socially mediated signs of success or failure, (alternately good-bad, right-wrong) are manifest in the situation, the more effectively order can be maintained, but also the more effectively challenge to the students will be decreased. Perhaps, a high frequency of critical evaluation is stress-inducing. As an empirical question, it is one worth exploring.

The foregoing relationship, the effects of competence upon choice can be viewed as an inter-episode issue. Once a person has chosen a course of action, the question can be asked: how long will he persist in that activity? This is an intra-episode issue.

In a situation where a person is free to continue at a task that is minimally affected by situational constraints and demands, he will tend to persist at the task inversely to the degree of experienced success OR failure in performing the task. Put somewhat differently, individuals will respond to a challenge under stress-free conditions. On the basis of the findings that led to this conclusion, one might question the efficacy of the immediate and invariant feedback (right-wrong) as commonly found in programmed instruction. An alternative procedure for constructing programs is suggested by our results.

Instead of presenting frames linearly within blocks, entire blocks or large sections of a block should be presented as a unit, followed by a multiple item test. Error responses in the test should point to hints, i.e., relevant information is provided in the program, giving the student opportunities to arrive at solutions. Such an organization of a programmed text reduces the frequency of "socially" mediated evaluation, thereby increasing the likelihood of the experience of becoming more successful.

Communicating success or failure in the context of an experiment is usually confined to a simple and standardized form, such as saying right," "correct," "good," "wrong," "incorrect," etc. This procedure is necessary in the interest of achieving a degree of "control" required by the experimental design. In naturalistic situations, however, interpersonal evaluations are transmitted by gestures and by natural language.

In spite of the central role that natural language plays in human behavior and organization, it is a little examined phenomenon. Because of the importance we attach to "socially mediated evaluations" for understanding the development and function of self-concepts, we conducted a number of exploratory studies of the effects of selected linguistic parameters upon the transmission of information. Also reported in this volume, in Chapter III, are a series of experiments which were not done under the auspices of the contract, but are seminal and provocative to the main issues studied under the contract.

Verbal conditionality (described in Chapter III) is a variable which is easily identified in language behavior (when it occurs) and which has clear implications within a theory of cognitive processing. Operationally, it is identified by the presence of selected functor words (if, might, maybe, perhaps, or, etc.) or grammatical constructions which signal a subjunctive-like mood.

Theoretically considered, verbal conditionality can be thought of as a complex trait which is not correlated with intelligence test scores, but does account for variance in a concept attainment task, does correlate with rating scale style, and does predict to persistence of attitude change.

An experiment which culminated in a series of more or less formal explorations of the effect of sentence structure on information acquisition (learning?) is described in Chapter IV. Self-concepts were not brought directly to bear in the studies, however individual differences in language processing were suggested. Inaccurate persons, i.e. those who acquired little accurate information, gave evidence of being inferior in their capacity to store factual information in a functionally ordered form. In addition, the data suggested that differences in syntactic form contribute to difficulties in processing information.

While self-ratings of competence and socially mediated evaluations were not considered in these studies, the conclusions contribute to our understanding of individual differences in the processing of communicated information and the behavioral effects of these differences. Suffice it to say that the point of tangence between linguistic variables and self-concepts needs to be made empirically explicit. The implication of the "linguistic studies" reported here is general. Obviously, because of the gross "verbalness" of instruction, the effects of a sentence structure of the communicated message upon information acquisition is a proposition of concern to educators. Furthermore the observed relation between individual differences in syntactic style (verbal conditionality) and information processing (concept attainment and attitude change effect) points to a class of pupil parameters to be reckoned with. It also raises questions regarding the possibility of systematically training pupils in linguistic styles that are more efficacious for effective teaching.